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Clinical Section.

President—Sir HERBERT WATERHOUSE, F.R.C.S.

Specimens from a Case of Multiple Bony Lesions, Shown in November, 1925.

By J. H. SHELDON, M.D., M.R.C.P. (Wolverhampton).

(BRIEF abstract of the post-mortem findings. The specimens from this case are now in the Museum of the Royal College of Surgeons, London. A full account of the case will be published later.)

This case appears to stand quite alone, and does not fit in with any of the diseases of bone at present described. The post-mortem findings can be classified as follows:—

(1) There has been an extensive *new formation of bone*, particularly in ligaments and tendons, but also in muscles. This process, while widespread, is most marked at both knees, where large masses of bone have formed in the quadriceps muscle and in the infrapatellar tendon, in the latter case there being a firm bony union with the tibia. There was also much irregular bony transformation of the ligamentum nuchæ and of the anterior ligaments of the vertebral column. Three developments of this process deserve separate mention: (*a*) A mass of bone weighing 27 grm. had formed in the tendon sheaths of the long extensor tendons lying over the right ankle. (*b*) The structure of the wrist-joint had been changed by a process of ossification extending from the radius into the articular disc and the internal lateral ligament of the wrist-joint, while at the same time the semilunar bone had become firmly attached to the radius. The distal bones of the carpus were all firmly united to each other by fibrous tissue. There was also much new formation of hard nodular bone in the interosseous ligament. (*c*) A number of bony plates had formed in the cerebral arachnoid. Roughly, some 16 sq. cm. of arachnoid had been affected by this bony transformation. Over the anterior end of the right frontal lobe a mass of bone had formed weighing 4 grm. These plates showed a smooth outer surface and a rough, ridged, inner surface corresponding to the local cerebral topography.

(2) In a few places, apparently *true exostoses* had formed. These were illustrated by: (*a*) The sella turcica, showing two small exostoses on the right posterior clinoid process. (*b*) The third right rib, with an exostosis arising near the head. On section, the exostosis was seen to be covered by a layer of compact bone continuous with that of the rib, and it had a core of cancellous bone also continuous with that of the rib.

(3) The *pituitary gland* was the seat of definite cellular abnormalities. These were (*a*) an increase in the eosinophil cells of the pars anterior; (*b*) an increase of the colloid in the pars intermedia; (*c*) an hypertrophy of the pars nervosa. Connected in all probability with these cellular changes in the pituitary were certain abnormalities in the growth of the long bones, best evidenced by the femur. This bone is very big even for a man of his height (6 ft. ½ in.) and is of massive appearance. Measurements show that in particular there is relative enlargement of the head and neck and of the popliteal region, while the shaft of the bore is greatly increased in its antero-posterior diameter.

(4) A *small tumour* was found in the position of the *left upper parathyroid gland*, of ovoid shape, and separated from the thyroid by a fibrous capsule. Histologically, the tumour consists of cells arranged in all gradations from solid columns to alveoli containing colloid. It is doubtful whether this tumour is to be regarded as a parathyroid tumour or an adenoma of the thyroid.

(5) The *bone-marrow* showed *extreme aplasia*. The red marrow was extensively replaced by fat, and histological studies revealed the fact that both red cell and

leucocyte formation were almost entirely inhibited. The cells were dominantly of the lymphoid type, and the presence of numerous plasma cells was taken to mean that the atrophy may have been preceded by a chronic inflammatory process.

(6) An enormous *periosteal sarcoma* had developed at the *upper end of the right humerus*, weighing 23½ lb. The progress of this was illustrated by photographs. Histologically, it consisted of spindle cells in its peripheral parts, cartilage and bone being present nearer the centre. The tumour was remarkable in that, with the exception of two small button-shaped plaques on the right lung (sections of which are shown), it gave rise to no metastases.

I desire to express my thanks to Professor Swale Vincent and Dr. O. C. Gruner for their reports on the histology of the pituitary and of the bone-marrow respectively, and to Dr. S. C. Dyke for his reports on the rest of the histological material.

A Case of Arthritis and Osteo-porosis.

By L. S. T. Burrell, M.D.

V. S., aged 46, female.

History.—Fingers and toes have gradually become deformed during the last five years.

Present condition.—The phalangeal bones of fingers and toes are much wasted, this causing considerable deformity. X-ray examination shows also osteo-arthritic changes in the metacarpal and metatarsal bones.

Tumour of Skull: Jacksonian Epilepsy.

By C. F. T. East, M.B.

Patient, male, aged 68.

History.—Three years ago hit the top of his head on the under surface of a steel girder. Did not become unconscious and the subsequent swelling was not very large. For the last eighteen months has suffered from attacks of Jacksonian epilepsy which begin as flexor spasms of the left foot and spread up the left side of the body to the left hand. These motor symptoms are accompanied by sensory symptoms. At present there is weakness of the left hand and leg, with increase of reflexes and an extensor response in the left foot. There is also weakness of the left side of the face. On the vertex on the right side there is a bony lump, fairly smooth on the top with a flattened convex surface. He has pain here at times. This lump was first noticed about eighteen months ago and has slowly become larger.

Skiagram shows an area of rarefaction at the site of the lump.

Wassermann negative.

Cirrhosis of Liver; Telangiectases; Deformity of Metacarpals.

By C. F. T. East, M.B.

Patient, a girl, aged 11.

History.—Telangiectases appeared on the face first about the age of 18 months. When she was shown at the Children's Section in October, 1920, by Dr. Langmead,[1] the liver was large and hard, and the spleen was big also. There was no ascites. Facial telangiectases were marked. Wassermann twice negative.

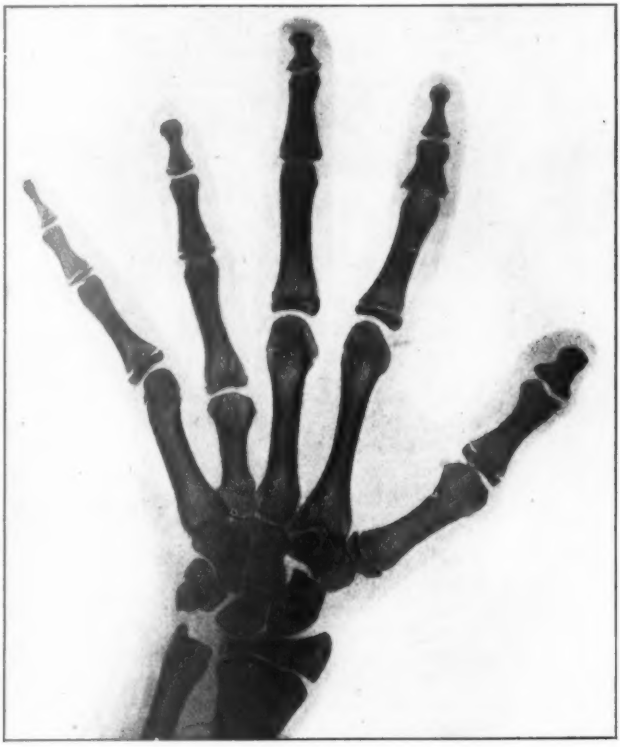
First seen at King's College Hospital, December, 1925, when she was brought in suffering from diarrhœa.

Since the age of 5 she has had one attack of hæmatemesis and melæna when she had whooping cough at the age of 6. Epistaxis has often occurred. Further hæmatemesis at the age of 9.

[1] *Proceedings*, 1920, xiv (Sect. Study Dis. Child.), p. 14.

Clinical Section 3

Present Condition.—The liver and spleen are large and hard. Telangiectases are seen over the face and hands. In February the Wassermann reaction was doubtful, but was positive in May when the liver and spleen became a good deal larger. They have decreased in size under iodides and mercury. A pancreatic lesion was suspected but tests of blood-sugar curve and chemical examination of the fæces were negative.



There was, however, a very high urinary diastase. The diarrhœa seems to be of nervous origin.

There is also a symmetrical deformity in the hands. The fourth metacarpal on each side appears to be abnormally shortened, this being due to a premature union of the epiphysis and the body.

Points of Interest.—(1) Fairly good health in spite of extensive hepatic and splenic lesions of long duration. (2) The appearance of a positive Wassermann after so long. (3) The extensive telangiectasia associated with the cirrhosis. (4) The bony deformities which one can hardly connect with the other lesions.

Dr. E. STOLKIND said that, in his opinion, it was not a proved case of congenital syphilitic cirrhosis of the liver. Infants might be infected with syphilis in the first months of life by wet-nurses, relatives, &c.[1] It was necessary for the diagnosis in this case to find signs of syphilis in the parents or else a positive Wassermann.

[1] E. Stolkind, "Hereditary Syphilitic Aortitis," *Brit. Journ. Child Dis.*, 1920, xvii, p. 126.

A Case of Paget's Disease with Calcification of the Arteries.

By C. F. T. East, M.B.

F. M., aged 58, male, engaged in business.

History.—Bowing of the legs first noticed in India four years ago. During this time the head steadily increased in size. Since this time has noted increasing shortness of breath on exertion.

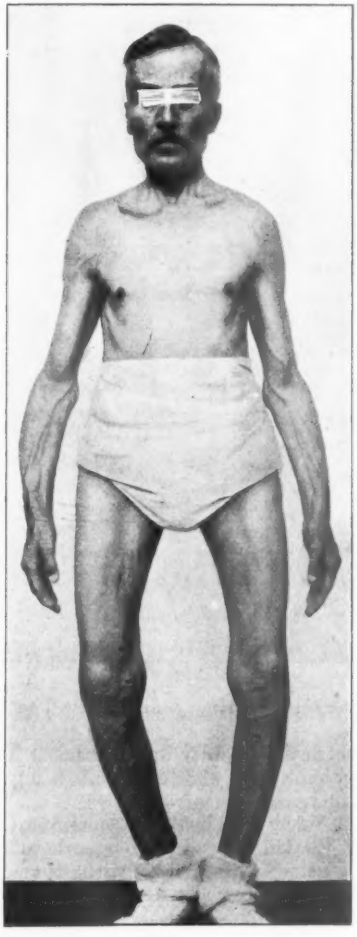


Fig. 1.

Attacks of rheumatic fever at ages of 22 and 34 respectively.

Present Condition.—The skull, the clavicles—particularly the right—the forearms, femora, and tibiæ show the typical changes due to osteitis deformans. (See also skiagram.) (Figs. 1, 2). The heart shows aortic stenosis and also some reflux, with

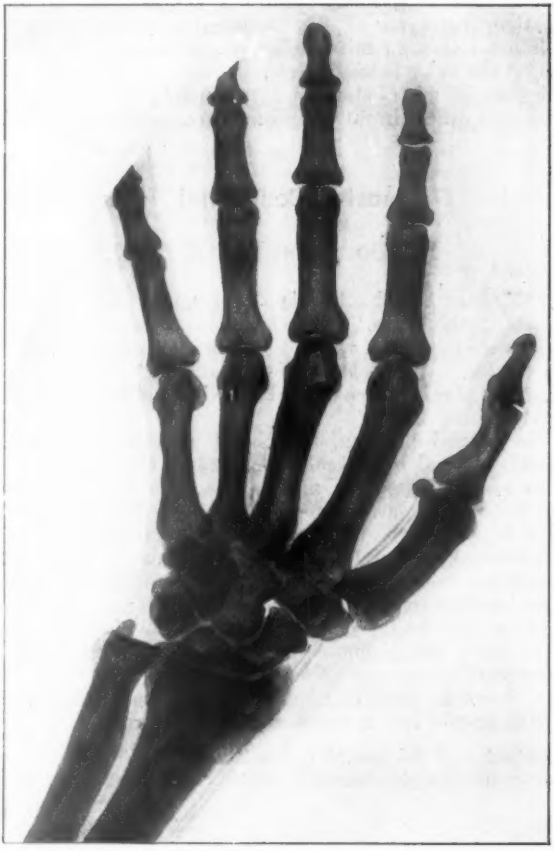


FIG. 2.

marked left ventricular hypertrophy. There is advanced calcification of the arteries of the limbs, well seen in the skiagram (fig. 2).

The photograph (fig. 1) shows the kyphosis and general appearance.

Wassermann reaction: doubtful.

Electro-cardiogram shows preponderating hypertrophy of the left ventricle, inversion of T-wave, and auricular extrasystoles.

Left Recurrent Laryngeal Paralysis and Mitral Stenosis.

By DOUGLAS FIRTH, M.D.

MALE, aged 39. No history of rheumatic fever. Five weeks ago the patient suddenly "lost his voice" and at the same time dyspnœa was noticed.

On examination, paralysis of left recurrent laryngeal nerve was found with auricular fibrillation following mitral stenosis. The cardiac condition is improving under digitalis and the voice is less hoarse.

This complication of mitral stenosis, mentioned by all the text books, is actually a rarity, and the case differs in no way from those previously described in detail.

Case for Diagnosis (Congenital Heart Disease).

By DOUGLAS FIRTH, M.D.

E. B., FEMALE, aged 10. No history of rheumatic fever, but has now and again complained of pain in the knees. Of the infectious diseases she has had measles only. Plays games with other children without discomfort, but there are weeks when she is languid and tired.

On examination: healthy looking child with neither dyspnœa nor cyanosis. Fingers not clubbed.

Apex beat in normal position, the thrust perhaps being a little full. First and second sounds normal on auscultation, and in the recumbent position a soft systolic murmur and a diastolic "murmurous noise" can be heard at the apex. On sitting up, in the left lateral position, and on full inspiration, the diastolic murmur becomes high pitched and musical, and can be heard all over the chest, and when it is most musical, a diastolic thrill can be felt at the apex. The variability of this musical murmur from day to day, and time to time, is most marked. The radiogram of the heart is normal: the electro-cardiogram shows an inverted T-wave in leads II and III. Whilst the child was in hospital, widely varying opinions were given about her case; the diagnoses of congenital morbus cordis, organic mitral disease and an exocardial murmur all being suggested.

The case is shown to elicit opinions as to the nature of the murmur and as to whether the child should live a guarded life or a normal one.

During the exhibition of the case, it was evident that opinions differed widely as to the nature of the case, with some preponderance in favour of the exocardial origin of the murmur.

A Case of Graves' Disease in a Child.

By BERNARD MYERS, C.M.G., M.D.

G. E., FEMALE, aged 14. School girl. (Previously shown before this Section.)

History.—When patient was aged 10 her neck began to swell and she complained of some difficulty in swallowing. At the Royal Waterloo Hospital the thyroid gland was found to be a little enlarged but no pressure was evident on trachea or œsophagus. She really could swallow quite well when reassured that

there was nothing abnormal present. She became rather hysterical a few months later but greatly improved under treatment by valerian and bromide. All her brothers and sisters are neurotic. She presented herself at hospital again in June, 1926, with a small goitre, and feeling very nervous and depressed. She had vomiting and diarrhœa for three days previously. The pulse was 90 to 100. She had palpitation. There were fine tremors of the fingers, no exophthalmos, but a "stare" was evident; Stellwag's and von Graefe's signs were absent. The basal metabolic rate was + 110 per cent., and O_2 consumption 363 c.c. per minute (Mackenzie Wallis). No cardiac dilatation, &c., was present.

As the condition was not improved by rest in bed and medical treatment, Mr. Maingot, at my request, performed a partial thyroidectomy on July 30, 1926, the upper two-thirds of the right lobe being excised. Histologically, it was typical of Graves' disease.

She has certainly improved since undergoing the operation; she is much less nervous and the tremors and tachycardia have disappeared. On September 20, the basal metabolic rate was + 10·1, and O_2 consumption = 202 c.c. per min.

Dr. E. STOLKIND said that cases of Graves' disease in children, especially in young children, were rare. The same held good with regard to old people, though he himself had shown three years ago at a meeting of the Clinical Section a case of Graves' disease in a woman aged 69. He had seen two cases of Graves' disease in mother and daughter. In the mother apparently the whole thyroid gland had been removed, and, since then, she had been suffering from tetany. In the daughter, ligature of the thyroid arteries was carried out, but so far not much improvement had resulted. In his (Dr. Stolkind's) opinion, operation in children suffering from Graves' disease should only be performed when all other means had failed to relieve the condition.

Congenital Heart Disease and Complete Heart Block.

By J. L. LIVINGSTONE, M.D. (introduced by Dr. DOUGLAS FIRTH).

D. J., AGED 6, male.

History.—No history of acute rheumatism, etc.

Present Condition.—Frequent coughs and colds. No great dyspnœa. Small and undersized. Mentally alert. No cyanosis. No finger clubbing.

Cardiovascular System.—Wide area of pulsation. Systolic thrill in pulmonary area. Apex beat 3¼ in. from mid-line in fifth space.

Area of cardiac dullness	First rib	
	½ in.	3½ in. in fifth

Harsh pulmonary systolic, best heard in second left space and audible over left side of chest. Not conducted to neck or left shoulder. Pulmonary second sound increased.

X-ray.—Large globular heart.

Cardiogram.—Complete heart block.

A Case of Syringomyelia, with Somewhat Acromegaloid Features.

By F. PARKES WEBER, M.D., and F. E. LOEWY, M.D.

THE patient, A. C., aged 24, English labourer, was seen in August 1926, suffering from a deep whitlow of the left index finger, and he had had previous whitlows and inflammatory and traumatic troubles in his left hand, mostly associated with little or no pain. There is decided dissociated anæsthesia in that hand; whereas ordinary

6 Firth: *Case for Diagnosis;* Myers: *Case of Graves' Disease*

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tactile sensation is hardly impaired, there is complete analgesia (as tested with needle-pricks) over the tips of the fingers and the ulna side of the hand, with definite hypalgesia over the rest of the hand; sensation for temperature is completely absent over the hand and is impaired over the remainder of the left upper extremity; there is also slight hypalgesia and therm-hypæsthesia over the extensor surface of the left thigh. There is wasting in the intrinsic muscles of both hands, especially of the right hand, which he is unable properly to close so as to "make a fist" with it; the muscular weakness involves not only the hand, but the whole right arm. He has considerable kyphosis of the vertebral column.

The patient evidently has syringomyelia, affecting both upper extremities; in the left one sensation is chiefly affected; in the right one loss of power and muscular wasting are more marked. The soft parts of both hands tend to be "swollen," but

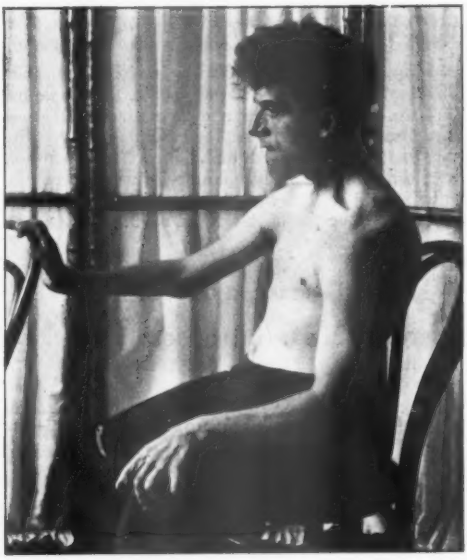

FIG. 1.

that is best marked in the right hand, especially, he says, in cold weather; the right hand is, in fact, a large "succulent hand" (a kind of "cheiromegaly"), sometimes noted in syringomyelia. Owing to the whitlows, &c. (though not always quite painless) the case may be grouped with those of the so-called "Morvan type" of syringomyelia, as far as the left hand is concerned. The cervical enlargement (corresponding to the upper extremities) is the part of the spinal cord involved, as it generally is. The patellar and Achilles reflexes are normal on both sides.

The patient's large protruding lower jaw (with lower incisor teeth in front of upper incisors) is somewhat acromegaly-like, but he has not the enlargement of the fleshy parts of the face (lips, nose, &c.) characteristic of true acromegaly (see figs. 1, 2); and a Roentgen skiagram of the sella turcica region of the base of the skull

shows the pituitary fossa to be round and somewhat deep, but not really abnormal and not suggestive of acromegaly.

There is no evidence of any disease in the thoracic or abdominal viscera. The blood-serum gives a negative Wassermann reaction, and his cerebro-spinal fluid shows nothing abnormal. Ophthalmoscopic examination and a rough examination of the visual fields give normal results. There is slight nystagmus on looking to the left. No cervical ribs are present (Roentgen ray skiagram).

REMARKS.

True acromegaly is in rare cases associated with syringomyelia. Thus H. J. MacBride[1] described two personal cases (a man and a woman), in which the changes

FIG. 2.

in the bony skeleton (of acromegaly) preceded those of weakness, wasting and sensory disturbance (due to the syringomyelia). He also analysed the literature relating to the association of syringomyelia with acromegaly. References to the subject are also given in the last German edition of Oppenheim's *Lehrbuch der Nervenkrankheiten*.[2] In our present case of syringomyelia, however, there is no true acromegaly.

[1] H. J. MacBride, "Syringomyelia in Association with Acromegaly," *Journ. Neurol. and Psychiopath.*, London, 1925, vi, pp. 114-122.

[2] Seventh German edition, edited by R. Cassirer, K. Goldstein, M. Nonne, and B. Pfeifer, Berlin, 1923, i, p. 558.

10 Weber and Loewy: *Case of Syringomyelia*

The patient's somewhat *acromegaloid* lower jaw is apparently a congenital or nearly congenital feature and he thinks that there has been no increase in his chin or in the size of his skull during recent years. He has prognathism of the lower jaw without acromegaly. "Acromegaloid" features of this kind are not at all rare and are doubtless sometimes familial peculiarities. Moreover, as mentioned above, the patient has not the large fleshy lips, nose, &c.—enlargement of the soft parts of the face—characteristic of true acromegaly. Nor is there anything in the Roentgen skiagram of his pituitary fossa or in the examination of his eyes (visual fields) to suggest acromegaly. His spinal curvature is due to syringomyelia, not acromegaly, and so is his slight "cheiromegaly."

Section of Dermatology.

President—Dr. J. H. SEQUEIRA.

Some Historical and Clinical Remarks on the Effect of Light on the Skin and Skin Diseases.

By Professor C. RASCH, M.D. (Copenhagen).

BEFORE I begin my paper I will thank this Section for the great honour it has conferred upon me, first, by electing me an Honorary Member, and secondly, by inviting me to give an address at this meeting. I count this a very great honour, because, so far as I am aware, it is the first time that a Danish dermatologist has received such an invitation. From the time I first attended a meeting of this Section, then called the Dermatological Society of London, in November, 1891—that is, thirty-five years ago—and met men like Radcliffe Crocker, Malcolm Morris, Colcott Fox and Pringle—charming persons and excellent dermatologists—I have always regarded English dermatology with great friendliness. Like the other branches of English medicine, it has, since Sydenham's day, given the first place to the clinical study of the diseases. Following Dr. Graham Little in his lecture on lichen planus (delivered in 1919),[1] I would say: "Clinical method has been the glory of the English school from the time of Sydenham, the father of modern medicine, to the present day." I am accustomed to say: "Medicine based on good observations is just as much a science as descriptive botany or zoology," a point which must be driven home at the present time in answer to the attempts of different experimenters and serologists to depreciate this branch of medical science. This contempt for the clinic has come to such a pass that a renowned physiologist has even said that clinical medicine is a played-out science and that we now only have use for experimenters. The fact of the matter is, however, that modern medicine rests equally on two pillars of support—clinical medicine and experimental medicine. In one case the clinical recognition of a fact comes first, in another the experimental. An experiment is often suggested by a clinical observation.

Assuredly Niels Finsen with his work on the light treatment of lupus vulgaris has deserved well both of Danish and of international dermatologists, but we ought not to forget his predecessors, and it will be convenient here to recall the work done by some few of these.

With regard to the question which immediately interests us, namely, the action of sunlight on the skin, the experimental demonstration of the fact was first made in some of the experiments of the English physician, Sir Everard Home (1763-1832), to which I will refer here, as I have never known any English dermatologist mention them. Hutchinson, Mackenzie, Robert L. Bowles, Sequeira, Adamson and others who have written on the effect of light on the skin do not allude to them; nor did Finsen know of them. I discovered the record of them twenty-five years ago after seeing them cited in a little note in Rayer's "Traité des Maladies de la Peau" (Paris, 1835) (one of the very best works in general dermatology and one without knowledge of which F. Hebra could not have written his "Hautkrankheiten"), and introduced an account of them into my Danish book: "Hudsygdomme og deres Behandling" (1st edition, 1903). From here the information spread into the Scandinavian literature (Würtzen and Fönss), and from these two authors into the German literature; but I have not been able to find a reference to it in the English literature. The article of Home is entitled: "On the black rete mucosum of the negro, being a defence against the scorching effect of the sun's rays," by Sir Everard Home, Bart., F.R.S., read November 9, 1820, *Philosophical Transactions*, London, 1821.

[1] *Journ. Cutan. Dis.*, 1919, xxxvii, p. 639; *Brit. Journ. Derm.*, 1920, xxxii, pp. 57, 95.

2 Rasch: *Effect of Light on the Skin and Skin Diseases*

Home starts his contribution with the remark that he had often thought over this question but that he had given it up in despair as he knew that black surfaces absorb heat. Two years before, however, his attention was again drawn to the matter when the, then deceased, President of the Society had told him

"that a silver fish, in a pond at Spring Grove, during a very hot summer, immediately after some trees by which the pond was shaded were cut down, was so much exposed to the sun's rays as to have its back scorched, the surface putting on the same appearance as after a burn, and rising above the scales of the surrounding skin. He saw the fish several times, and directions were given to send it to him, when it died, but he was not so fortunate as to receive it."

Of his experiments I will cite the following:—

"*Experiment 3.*—I exposed the backs of my two hands to the sun's rays, with a thermometer upon each; the one hand was uncovered, the other had a covering of black cloth, under which the ball of the thermometer was placed. After ten minutes, the degree of heat of each thermometer was marked, and the appearance of the skin examined. This was repeated at three different times.

The first time the thermometer under the cloth				91,	the other	85
,,	second	,,	,,	,,	94, ,,	91
,,	third	,,	,,	,,	106, ,,	98

"In every one of these trials the skin that was uncovered was scorched, the other hand had not suffered in the slightest degree; there was no appearance of perspiration on either hand.

"*Experiment 4.*—The back of a negro's hand was exposed to the sun with a thermometer on it, which stood at 100°; at the end of ten minutes the skin had not suffered in the least."

I cannot see any other interpretation of this than that the irritation of the skin produced by the sun was due to the light and not to the heat. It is interesting to observe how Finsen, who was unacquainted with Home's work, planned his first experiments almost in the same way.

Some years later Home's experiments were confirmed by an English army doctor in Corfu, John Davy (brother of Humphry Davy, and himself also a chemist). He showed that "the change of colour may take place without inflammation." He tried to find out whether there was a difference between the different rays of the solar spectrum, but he was unsuccessful.[1]

I think, therefore, that the recognition that the irritating and pigment-forming power of the sun is due to the light and not to the heat, is an English discovery made by Everard Home in 1820, and that the history of the biology of light should begin with Home and Davy, and not with Charcot (1858) and Bouchard (1862) as one often sees it stated.

Another early contribution to the biology of the light is perhaps found in Colhoun's[2] experiments on the sensibility of the surface of the face to light (Philadelphia, 1823).

Two early and not very widely known contributions to our knowledge on the influence of solar rays on the skin are the two papers by *Robert L. Bowles*, in the *Alpine Journal*, 1888, and in *The British Journal of Dermatology*, 1893. These two papers contain very good and original observations on the effect of light on the skin.

Omitting the discussion of the normal action of light on the skin, I will briefly mention some of the effects of light on the abnormally or morbidly reacting skin. The first to describe one of the diseases produced by the sun was Willan (1798). He called the affection eczema solare, but the complaint described by him answers best

[1] "Observations on the Effect of the Sun's Rays on the Human Body," *Trans. Med.-Chir. Soc. Edin.*, 1829, p. 256.

[2] *Amer. Med. Recorder*, 1823, vi, p. 63.

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to the eczema-like polymorphous light-eruption later described by myself. Willan was the first to see that ointments are useless in the treatment of the disease. He writes: "the parts affected do not bear unguents or any stimulant application." In 1835 Rayer described vesicular and papular lesions produced by light on the hands and back ("Mal. de la Peau," I, p. 496). On the other hand Bazin in 1860 described hydroa vacciniforme; Kaposi in 1870 xeroderma pigmentosum (this author did not speak of its dependence on the light, a discovery made many years later); J. Hutchinson in 1878 prurigo æstivalis; Veiel in 1887 eczema solare, which is not an eczema but undoubtedly corresponds most closely to Willan's eczema solare and to what in 1900 I described as the "eczema-like polymorphic light-eruption." This

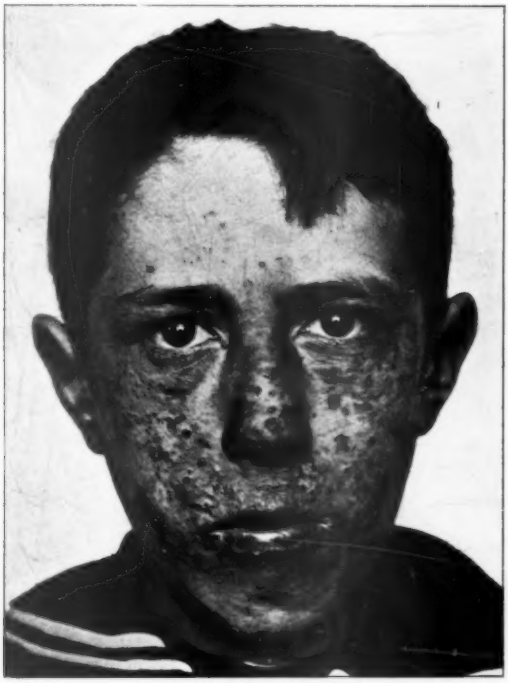

FIG. 1.—Chronic polymorphic light-eruption (papules, raised erythematous patches, lichenoid patches).

rash, which causes intense itching, consists partly of oval and round, slightly raised, erythematous spots of variable size, partly of irregularly grouped vesicles and partly of small scab-covered papules. On the hands, which are diffusely swollen and cyanotic, there are found numerous infiltrated, or urticarial, erythematous plaques and remnants of pustules, with a small central dimpled scab.

In 1906-1907 Dubreuilh (of Bordeaux) stated that most of the epitheliomata of the face, together with the common so-called senile alterations of the skin, are produced by the sun's light. A single case of this nature was that published by

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Marmaduke Sheild in the *Lancet*, 1899.[1] Later on, Unna described his "Seemannshaut" without alluding to this condition being brought about by the light. As early as 1893 Robert L. Bowles foretold the sun's faculty of being able to produce epitheliomata in these words:

"If the sun's rays will produce sunburn, erythema, eczema solare, inflammation, and blistering, it is clearly capable of producing deep and intractable ulcerations of a low and chronic nature."

In 1911 J. H. Sequeira described a new skin disease produced by light under the title "Permanent Freckles" ("Diseases of the Skin," p. 65). It was dis-

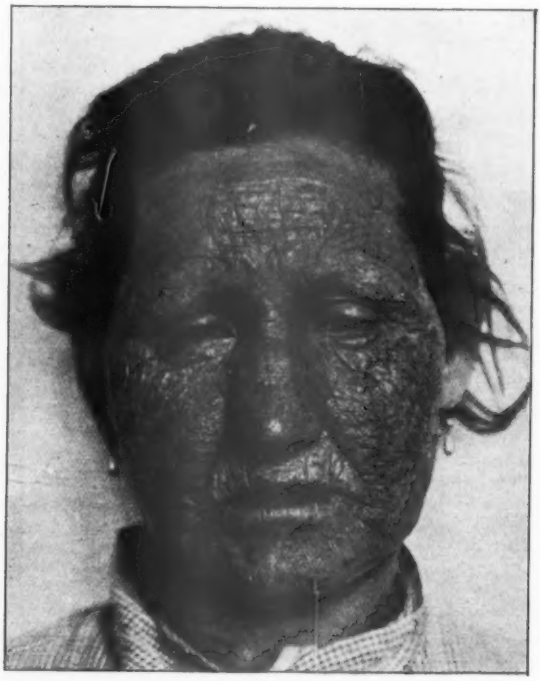

FIG. 2.—Chronic polymorphic light-eruption (terminal phase, diffuse lichenization).

tinguished by a steadily increasing outbreak of pigmented spots resembling freckles on the face, just as in xeroderma pigmentosum, but without the other signs of this disease. I regard it as being akin to the latter disease, but a milder affection. Lastly, Riehl in 1917 described the so-called war-melanosis, first observed by him, the almost black pigmentation of which seems to be called forth by light.

Between some of these different diseases there are transitions; thus, it is certainly impossible to keep Hutchinson's prurigo distinct from my polymorphic and eczema-like eruption, a conclusion to which my friend and assistant, H. Haxthausen, has arrived by examining all the many cases of light eruptions occurring in the Dermatological Clinic of the University, Copenhagen. (See his important book,

[1] *Lancet*, 1899, i, p. 22 (with coloured illustration).

" Hudsygdomme fremkaldte af Lyset," Copenhagen, 1919.) I believe that this is so, and that all these eruptions should be included in the term, chronic polymorphic light dermatitis, or merely light rashes of a papular, erythematous, lichenoid, urticarial type. It is found that the skin reacts characteristically for each individual against the itching caused by the light, sometimes with papular lesions, sometimes with erythematous or urticarial lesions, sometimes with more or less diffuse weeping and (after having persisted for a long time) lichenoid lesions (figs. 1, 2). Sometimes there are secondary infections with impetigo or folliculitis, so that

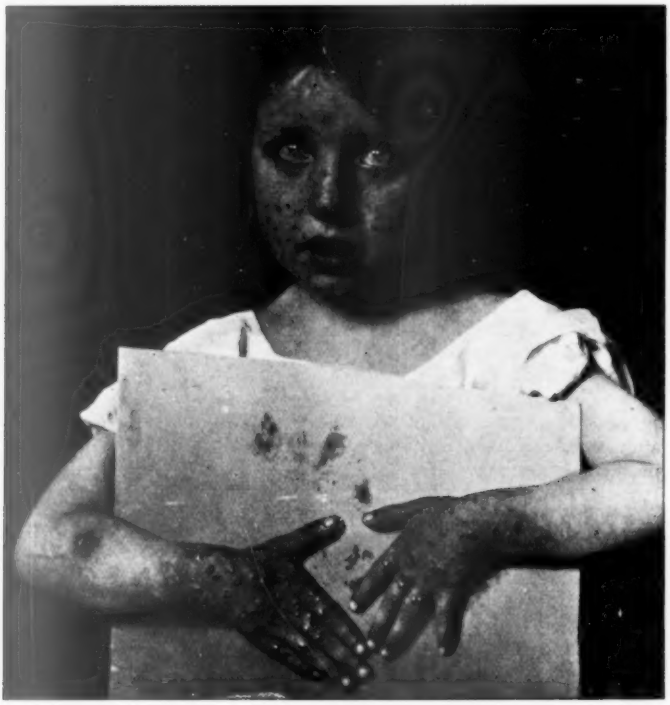

FIG. 3.—Hydroa vacciniforme.

the picture may be extremely varied and distinct in the different cases. Rarely, cases occur with small necroses distributed between the other lesions, which represent a transition to hydroa vacciniforme (Bazin), though these necrotic lesions are not at all like the very special lesions of true Bazin's hydroa. These cases support the opinion put forward by H. G. Adamson that there is a relationship between the milder cases of summer eruption and Bazin's hydroa vacciniforme.[1]

These light eruptions are sometimes hereditary. The reason that they are so

[1] *British Journal of Dermatology*, 1906, xviii, p. 135.

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common in Denmark (among 31,000 cases of skin diseases in the years 1911-1925 there were 230 of these cases) is probably because the colour of the skin and hair is so frequently blonde. The skin rashes on the face, hands and lower arms, are often attended by itching and a papular rash on other completely covered parts of the body. This general tendency to itching may perhaps be the pathogenetic factor in the occurrence of some of these light eruptions, for it might be surmised that a primary itching condition of the skin produced by the light, at least in some of the cases of lichenoid polymorphous light-dermatitis, may be the cause of the rash. Whether this is true it is very difficult to ascertain, for most of the patients are children who are unable to give proper information.

While I thus believe that prurigo æstivalis cannot be kept distinct from the polymorphous light rash, I consider that under the name hydroa vacciniformis we are confusing at least two different diseases. One of these is the affection described by Bazin which is characterized by small, scattered, elevated spots in the epidermis, varying in size from a lentil to a pea, at first surrounded by a red border. The smallest have an opalescent and pearly lustre. The largest have a whitish or yellowish periphery and a bluish-brown or black, slightly depressed centre. The lesion terminates in a small cicatrix (fig. 3). This is the typical form, but according to Bazin there may be rather larger yellowish impetigo-like scabs in some cases. This disease only gives rise to scattered scars and is not associated with porphyrinuria or other symptoms. Only once I have seen a case of atypical hydroa vacciniforme (pea-sized, pale red papules with central vesicles) in a child with porphyrinuria. This case is under observation and a report will be published by Dr. Haxthausen.

The other form consists of a special symptom-complex composed of porphyrinuria, the outbreak of large pemphigus-like blebs on the face, ears and hands, which lead to gangrene and a great loss of substance. In addition, atrophic processes occur in the fingers which remind one of scleroderma or Raynaud's disease. This affection, which had previously been described under other names, was first attributed to light by Professor T. M'Call Anderson, of Glasgow, when, under the title, "Hydroa æstivale in Two Brothers Complicated with the Presence of Hæmatoporphyrin in the Urine,"[1] he reported two cases without any discussion whatever of their relation to Bazin's hydroa vacciniformis or the hydroa æstivalis of earlier authors. These two cases showed the following symptoms:—

The two patients, who were brothers (23 and 26 years of age), had a bullous eruption on the face and hands; some of the blebs reached the size of a five-shilling piece. There was considerable deformity of the nose, ears and fingers. The external part of the nose was entirely absent. All the fingers were deformed, ankylosed, and shortened. The patients also had congenital porphyrinuria.

Previous to M'Call Anderson's cases two other cases of this disease were published, namely, Schultz's and Gagey's, but with other diagnoses. (Schultz's case was called pemphigus leprosus and Gagey's xeroderma pigmentosum.)

In Schultz's case (1874), the patient was a man, aged 33, with porphyrinuria from childhood and a rash of large blebs. The nose and one ear were missing. The hands were atrophic and the nails rudimentary. At the autopsy a small, hard, cirrhotic liver was found and very considerable enlargement of the spleen. One suprarenal was atrophic. All the cranial bones were dark brown.

In Gagey's case (1896), a boy, aged 14, who had been ill for eleven years, had porphyrinuria and large blebs resembling pemphigus on the hands and face, diffuse pigmentation of the face, atrophy and retraction of the skin of the lips, ears and nose. The hands were atrophic and greatly deformed. There was atrophy of the terminal phalanges and ankylosis of several joints.

[1] *British Journal of Dermatology*, 1898, x, p. 1.

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Vollmer's case (1903) (fig. 4), was that of a woman, aged 45, with atrophy of a large part of the face. The eyelids were shrunken, the nose completely sunken in, the skin of the hands atrophic and the hands themselves deformed. The terminal joints of both index fingers and thumbs were missing. According to subsequent information from Hans Fischer (cited by Mackey and Garrod), the patient later became blind and died at the age of 65. As long as she could remember she had had red urine, the colour of which was due to hæmatoporphyrin. Although there were no signs of syphilis the case was regarded as one of hereditary syphilis.

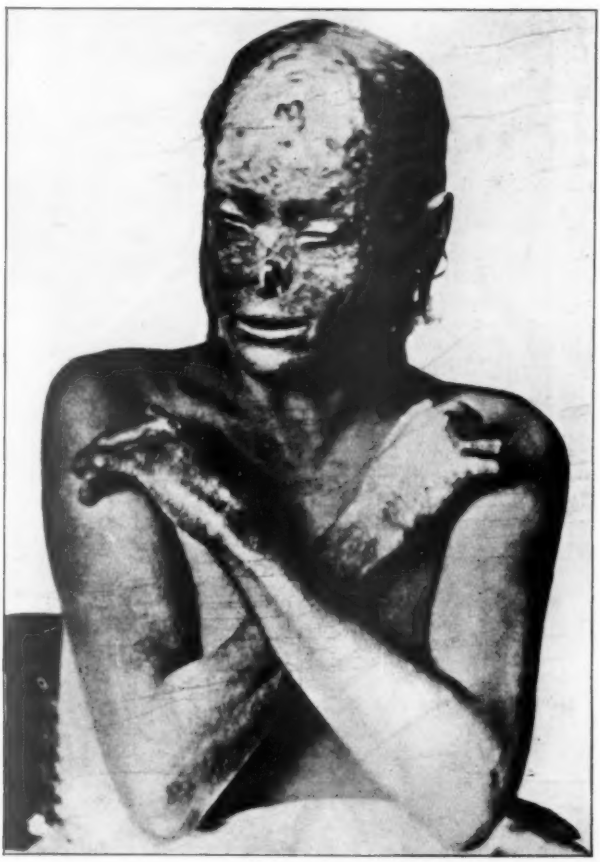

FIG. 4.—M'Call Anderson's disease (Vollmer's case).

In Linser's case (1906), the patient was a man, aged 44, with porphyrinuria and extensive cicatricial lesions of the face (ears, nose and upper lip). The ears and the external nose were entirely absent, and there was sclerodactylia (figs. 5*a*, 5*b*).

Ehrmann's case (1905 and 1909, also described by Gross, 1910) was that of a man, aged 31, with a bullous eruption from early childhood, porphyrinuria and lesions of the fingers like sclerodactylia. Two sisters were said to have had the same disease.

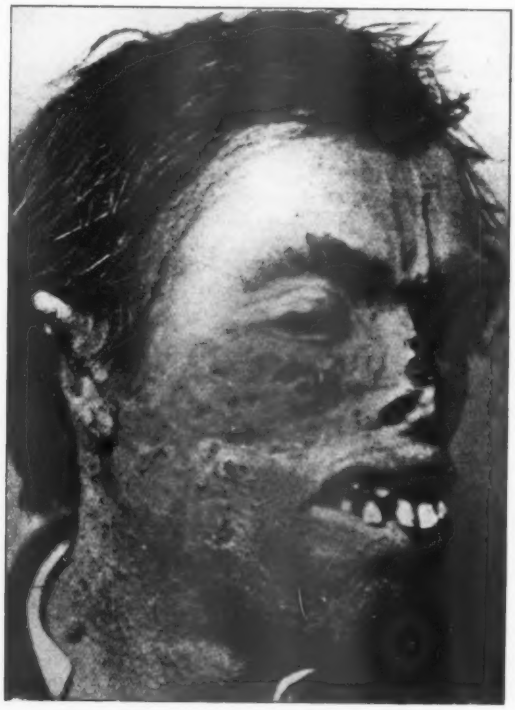

FIG. 5*a*.

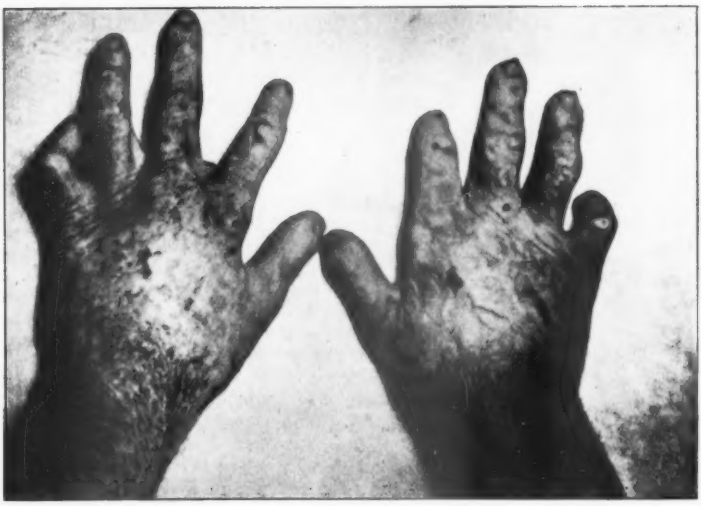

FIG. 5*b*.

FIG. 5.—M'Call Anderson's disease (Paul Linser's case).

Günther's case (1911) was that of a man, aged 18, with porphyrinuria and blebs on the face, like those occurring after burns, from early childhood. Latterly he had had blebs on the hands up to the size of a shilling, which left deep ulcers. There was purulent paronychia and the nails were cast off. There was brown pigmentation of the whole body. Cicatricial changes were present over the whole face and the nose had disappeared. There were lesions of the fingers resembling sclerodactylia, with atrophy of the terminal phalanges and ankylosis of the last joint. The skin of the hands and fingers was atrophic, smooth, tense and shiny. The nails were atrophic. Directly after the exposure to light an almost black pigmentation of the skin very rapidly appeared. The bones were brown. The spleen was enlarged.

Fischer's case (reported in Hausmann's "Lichtbiologie," p. 165) was that of a woman aged 30 with porphyrinuria congenita, whose grandmother was a sister of the great grandmother of Vollmar's patient. She had lost her upper lip, nose and an ear. There was necrosis of the distal part of nearly all the fingers, ophthalmia, and blindness of the right eye, and extensive scar formation of the cranium. The disease was diagnosed as lupus and treated with Finsen light for a time.

These nine cases form such a characteristic picture, distinct from the typical hydroa vacciniforme, by the association of (1) congenital porphyrinuria; (2) the large blebs caused by light with ulceration and complete destruction of nose and ears, and (3) the lesions of the hands resembling sclerodactylia, that I assume it must be a specific disease, a *porphyrinuria cum gangræna cutanea et atrophia manuum*. As M'Call Anderson was the first to recognize that the cutaneous symptoms of this remarkable disease were caused by light, it might also be called M'Call Anderson's disease.

There are cases of congenital porphyrinuria like that of Mackey and Garrod's, in which, after lasting for six years, the skin affections only consisted of bullæ, purpuric spots, excoriations and miliary epidermic cysts without loss of substance. The case was also remarkable from the fact that all the teeth of the six-year old boy were red—a hitherto unique observation.

A similar case was reported by Cappelli whose patient was a boy of five with porphyrinuria and blebs the size of a bean on the hands and face. He also had diffuse hypertrichosis of the face, and the nails were shed during the attack.

A case of quite special nature is that published by Mobitr (1923). The patient was a man, aged 32, with permanent porphyrinuria, bullous and necrotic skin-lesions, with lesions of nose, eyes and hands, anæmia, spleen enlargement and dental malformation.

This case is perhaps of the same natare as the disease described in Japan under the name of *congenital porphyrinuric anæmia* (Sato and Takahashi), an affection characterized by anæmia, tumour of the spleen, porphyrinuria and necrotic skin lesions (see also Toyama, list of references).

Porphyrinuria is not always associated with sensitiveness to light; take for instance Hegler, Fränkel and Schuman's case, in which the patient, a woman, aged 32, died from tuberculosis. She had porphyrinuria, marked pigmentation of the parts of the skin exposed to light, which resembled a pronounced chloasma uterinum, and extreme hypertrichosis of the face, so that she was shown in the fairs as "the bearded woman"; also H. Weiss's case, that of a woman, aged 27, with porphyrinuria, who did not show any sensitiveness to light.

It must also here be remembered that there is no light sensibility in persons with porphyrinuria caused by taking sulphonal and trional. Perhaps the truth is that porphyrinuria is not the real cause at all, but that the disease is due to an unknown "x" (probably of an endocrine nature) and that porphyrinuria, sensitiveness to light and trophic lesions of the fingers occur among the symptoms.

I have myself once seen a case of symmetrical gangrene of the ears in association with suprarenal disease caused by congenital syphilis, and there is a case reported in the literature of a child of five with congenital syphilis who had gangrenous affections of the cheeks, ears and hands in association with porphyrinuria (Königstein and Hess). On the other hand,

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White saw a case of a light-rash, with partial destruction of the alæ nasi, and deformity and ankylosis of several fingers, but no porphyrinuria.

Cases of light-rash occur which can neither be included under hydroa vacciniforme nor under M'Call Anderson's disease, but time does not allow a description of them being given.

I will only cite one case which Dr. A. M. H. Gray[1] reported to this Section on December 20, 1923, under the title of "Hæmatoporphyria congenita with Hydroa æstivale," which referred to a girl of 15 with porphyrinuria congenita and a scar-forming bullous eruption ("blisters") on the face, hands and forearms since the age of 5, but without the loss of the external nose and without lesions of the fingers.

This case is difficult to classify but if the patient lives to be 30 perhaps it will develop into a case of M'Call Anderson's disease.

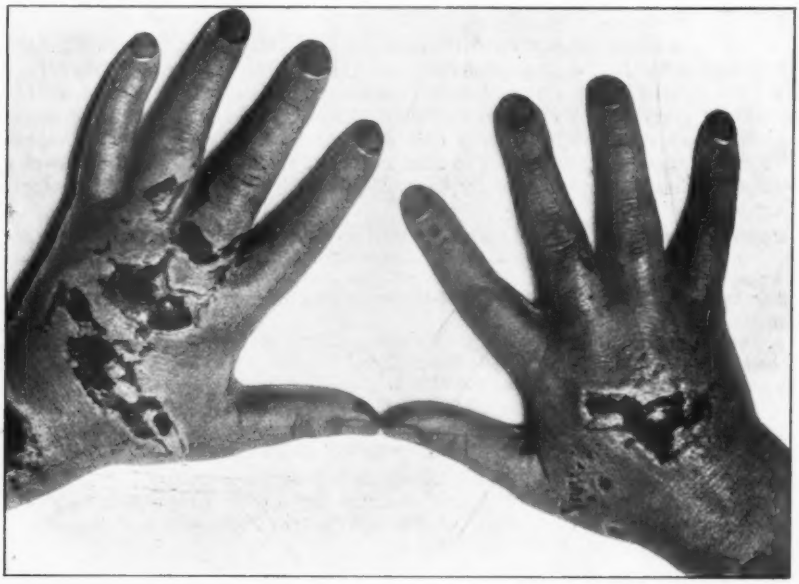

FIG. 6.—Excoriation after bullæ produced by the light in an alcoholic. ("Pseudopellagra.")

The whole question of the significance of porphyrinuria in light diseases is still undecided, and needs fresh investigation. The relation of these diseases to epidermolysis bullosa hereditaria ought also to be further studied.

Alcoholism, equally with porphyrinuria, seems to be a sensitizer for the development of some light rashes, and I show a photograph of a bullous rash ("pseudopellagra" of the French) in an alcoholic who had lain down to sleep in an intoxicated condition in one of our parks (fig. 6). Many of the bullous, more or less atypical rashes reported under the name of hydroa æstivale are perhaps due to alcohol or other unknown causes.

Passing over xeroderma pigmentosum, of which we have had two cases, pellagra, which is unknown in Denmark—the epithelioma produced by light,

[1] *Proc. Roy. Soc. Med.*, 1923-24, xvii (Sect. Derm.), p. 43.

freckles and the senile keratoses, I will briefly refer to the so-called war melanosis described by Riehl in May, 1919, of which we have had two cases. The first of them was shown by A. Kissmeyer and myself at the Danish Dermatological Society in December, 1916 (therefore before Riehl's publication), and described as a case of lichen planus with early and very marked pigmentation. The case was later described by Pirilä. The second case was described by Kissmeyer in the *Archiv für Dermatologie u. Syphilis*.[1] Diagnosis of lichen planus was made in the first case on the result of the histological examination, as the pathological finding greatly resembled lichen planus. For the same reason Obermiller[2] believes that these cases are a form of lichen planus. Yet most of the cases have such a typical

FIG. 7.—Riehl's disease.

appearance and resemble the disease described by Riehl to such an extent that I believe it must be a particular disease caused by light in specially predisposed persons under the influence of some toxic substance (fig. 7).

Of other diseases caused by light, we have had two cases of colloid degeneration of the skin ("Colloid milium"); one of these occurred in association with extensive sebaceous gland hyperplasia on the face and front of the chest in a man aged 63. This case was reported by Haxthausen at the Danish Dermatological Society, 189th Meeting, May 6, 1925 (fig. 8). The dependence of colloid milium on the

[1] *Archiv für Derm. u. Syph.*, 1922, cxl, p. 358.
[2] *Ibid.*, 1923, cxlii, p. 252.

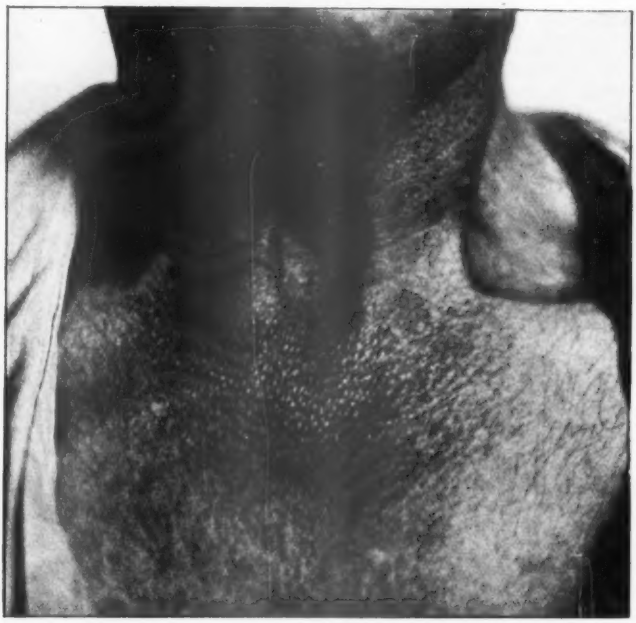

FIG. 8.—Hypertrophy of sebaceous glands on the light-exposed part of the chest. Patient had a colloid degeneration of the skin of the face ("colloid milium").

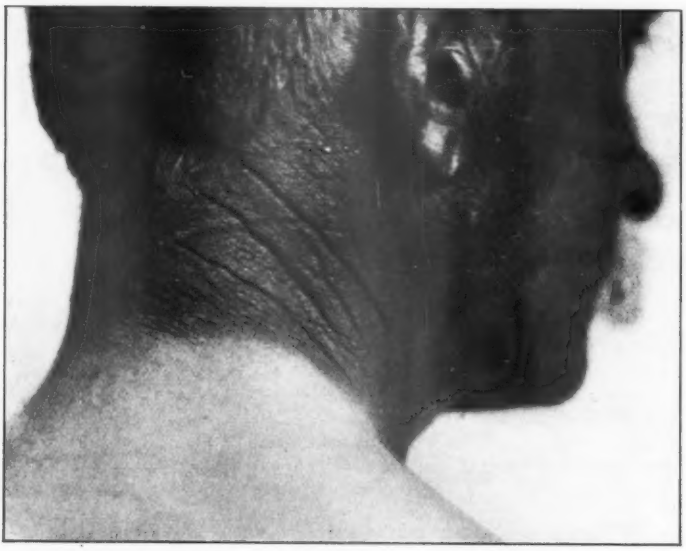

FIG. 9.—"Peasant's neck." (Jadassohn's cutis rhomboidalis nuchæ.)

influence of light had already been surmised by Besnier (1879) and by Celso Pellizari (1898). We have also observed many (not numbered) cases of the chronic redness and thickening of the skin of the neck produced by light almost constantly present in old farm labourers, which is also sometimes associated with colloid degeneration. This condition has recently been described by Jadassohn and Nikolsky under the name of cutis rhomboidalis nuchæ. I call it "peasant's neck" (fig. 9).

Akin to these diseases is the senile degeneration of the elastic tissue of the skin, called by Dubreuilh "élastome diffus de la peau," which likewise seems to be a light effect. The same probably applies to the other diseases of the elastic tissue (Kissmeyer and With).

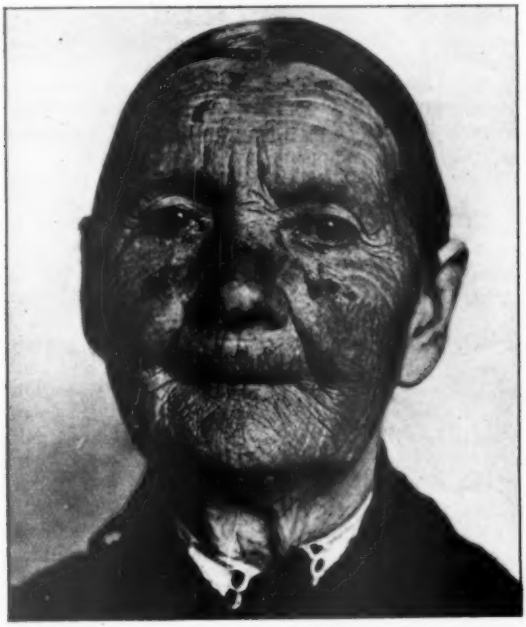

FIG. 10.—Senile light alteration of the skin (elastoma diffusum, Dubreuilh) with scattered senile keratoses and epitheliomas.

As already mentioned, all the other so-called senile lesions of the skin: pigmented spots, achromic and atrophic macules, local verrucose keratoses with eventual epithelioma, are caused by the light.

Among other cases we had one very striking case of an old woman from the country with all these lesions in the face. Only the parotid regions, which were protected from the light by a black handkerchief, showed a quite normal skin (fig. 10). There was also a typical case of elastoma diffusum, Dubreuilh, probably associated with colloid milium (non-microscopic).

With regard to the influence of light on other diseases I will only briefly mention smallpox. It is an old American, French and English experience (Picton, 1832; Piorry, 1848; C. Black, 1867; Barlow, 1871; Waters, 1871) that the rash heals

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without scars when the patient is kept in the dark. These observations, however, made no impression on physicians. Not until after Finsen's paper had been published in 1903 did this treatment become general. It ought to be employed in all cases of smallpox for it is of the greatest benefit to the patient if it is begun early enough. I have heard that physicians in some countries do not employ this treatment. Perhaps this is owing to difficulties in installing a "red room," but probably you would obtain almost the same result with a black mask on the face and a black bandage or black gloves on the hands.

Pityriasis simplex (seborrhœa sicca of German and English authors), the ordinary scaly disease of the scalp, the face and other parts of the body, is often irritated and sometimes rendered eczematous by light. Thus, most of the cases, especially those of pityriasis simplex of the face (pityriasis alba), come for treatment in the spring, and it is often observed that an originally mild case of pityriasis simplex is made worse and rapidly extends after natural or artificial light treatment, as it is partially or completely transformed into eczema. On the whole this disease is far more easily irritated in some persons than many doctors believe. Just as it is irritated externally by light, so is it often irritated internally, for example, by arsenic treatment or taking alcohol. To show the importance of light in the development of this disease Haxthausen (opus cit.) has arranged the cases from our policlinic for the years 1916 and 1917 according to the seasons. In these two years there were 146 cases. Of these, 108 occurred from January to June while there were only thirty-eight from July to December. The total number of patients was about the same for the two half-years. As the irritative power of the light in our country is at its greatest from March to June it is suggested that the cause of the outburst was the light. It is indeed an old observation in private practice that children with irritated pityriasis alba of the face are almost always brought up for consultation in the spring. In explanation of this fact Haxthausen has pointed to the absence of normal pigment in the pityriasis spots. It is, in fact, very commonly observed that these spots are far lighter than the surrounding skin, which is pigmented by the light. The irritation of pityriasis simplex by light is one of the causes of many cases of eczema of the face. When they are recent it is usually possible to distinguish them from the polymorphous rash, but when they are old and have been set up by scratching and different treatment, the differential diagnosis may be very difficult.

Acute eczema and many different kinds of artificial dermatitis often have a tendency to become localized in places which are the seat of chronic changes due to light vascularization, pigmentation, pseudo-atrophic conditions (cf. Brocq's "dermatose du triangle sterno-claviculaire"). This chronic change in the skin, which was described in a general way by Finsen, causes it to become a *locus minoris resistentiæ* and the site of election for artificial dermatitis and all kinds of other skin diseases. Thus, I have seen several cases of dermatitis after the use of sulphur, and fur dermatitis, especially localized in the sterno-clavicular triangle although the exciting agent had spread over the whole chest. Sometimes also you may see a chronic eczema dependent on pityriasis simplex (Unna's "seborrhœic eczema") exactly localized to the sunburnt parts of the breast and back of women.

With regard to pityriasis versicolor I have noticed during recent years, since it has become so common to take light baths, the remarkable fact that the brown pityriasis spots are bleached so that they become almost white, while the surrounding skin is brown. This is partly due to the underlying skin not being pigmented by the light and probably also due to the mould mycelium itself being bleached by the light (fig. 11). The mould appears not to be affected in its development, but continues to grow as usual.

In private practice I have seen two more of these cases, the aspect of which was

quite bewildering as to the diagnosis. These two patients washed and bathed themselves every day, and also took sunbaths, with the result that the pityriasis spots, besides getting white, became quite smooth. These white spots, surrounded by a very brown light-pigmented skin, suggested at first the diagnosis of vitiligo. Only by scratching the white spots did one obtain the true diagnosis.

With regard to rosacea it is often observed that when it occurs alone and also when it is complicated by pityriasis simplex it is greatly irritated and aggravated by light (thus, for example, by long rides in open motor cars). For this and other causes it is of practical value to divide rosacea cases into three categories, viz., (1) rosacea

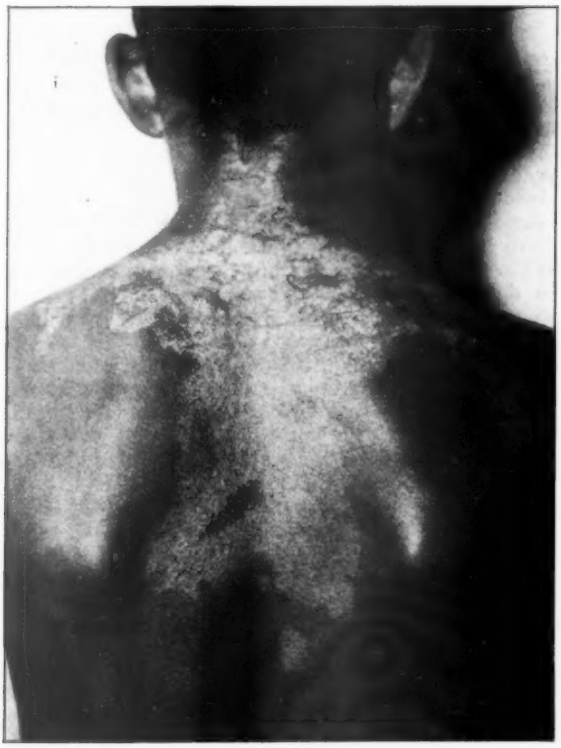

FIG. 11.—Pityriasis versicolor, white form on light-pigmented skin.

cum acne, (2) rosacea cum pityriasi, and (3) rosacea cum acne et pityriasi (and eventually scaly blepharitis). The first group you cure with sulphur, the second with tar, the third with sulphur plus tar (ichthyol).

A disease which is very decidedly aggravated by light, in fact often caused by it, is lupus erythematodes. I have seen several such cases in which the first outbreak was caused by the action of very strong light, either because the patient had lain in the sun for some hours in order to get sunburnt or because for some reason or another he had been treated with artificial light baths.

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The first case of this kind I saw was as early as in 1907 in a man who, in a short time after he began to wear a very low-necked sailor's jersey (in the Argentine), was affected with an extensive eruption of lupus erythematodes on the parts of the chest and back which were thus exposed to light. Since then I have seen many cases of this description.

I have also observed several times in lupus erythematodes of the fingers, that the disease entirely spares those parts encircled by the patient's rings. Lupus erythematodes on the back of the hand comes to an end where the sleeve begins, and the area of the same disease on the neck is bounded by the edge of the collar. Dr. Haxthausen has been good enough to group the cases from our Policlinic according to the months. There were altogether ninety-four cases. Of these, three began in January, seven in February, seven in March, fifteen in April, thirteen in May, nineteen in June, eight in July, five in August, five in September, three in October, four in November and five in December. Thus fifty-four, or over half the cases, began in the months (March-June) when the light is most irritating. I therefore believe that light is, on the whole, the most important external causal factor of this disease. Like Sir Jonathan Hutchinson, Besnier, Boeck and others I regard tuberculosis as the most important internal causal factor, especially the relatively benign affections of the glands and bones. Of great interest to me are those cases in which lupus erythematodes, or at least a disease extremely like it, is caused by the light treatment of chronic gland tuberculosis (P. Haslund's and With's cases). Similar cases have been seen by Sequeira and Erwin Pulay. In the early days, Hutchinson and Cæsar Boeck observed that lupus erythematodes showed signs of susceptibility to light irritation, and the opinion of the late Sir James Galloway agrees with my conception that the disease can be caused by light ("Some attacks of lupus erythematodes appear to be caused or to be specially influenced by exposure to the direct rays of the sun," cited from Allbutt's "System of Medicine," 1911, vol. ix, p. 81). This dependence of lupus erythematodes on light is important in the treatment of the disease, for the fresh eruptions disappear most readily upon putting the patient to bed in the dark, the spots being covered with a compress of cold boiled water, as the disease is, on the whole, favourably influenced by protection from light.

Many other skin diseases are caused or aggravated by light, for instance, dermatitis herpetiformis (Brocq, 1888, Magnus Möller, 1900, Stephen Mackenzie. 1893, and Rasch, 1901), Besnier's prurigo (Haxthausen, 1919), psoriasis (Joseph, 1906, Pick, 1924,—this disease is improved, however, in some cases under light treatment (fig. 12), urticaria (Crocker), purpura (Haxthausen, 1919), erythema multiforme (Haxthausen, 1919, and myself), as fig. 13 shows.

There are not many skin diseases which are actually improved by natural light. Even lupus vulgaris is not appreciably influenced by the local action of common light, but in this case an effect is produced by cauterization or burning with a mixture of heat rays and concentrated light rays. Another point is that the universal light bath often has a very beneficial action on this disease, but this is due to other and general effects on the organism. Of the skin affections that are usually benefited by light, there are acne vulgaris, the secondary syphilitic affections of the skin, elephantiasis and lichen planus. In these two last named diseases it is perhaps more the general action of the light that acts. That a papular syphilitic lesion is prevented from developing by light I showed by the account of a case reported in 1921 in the *British Journal of Dermatology and Syphilology*. This finding seems to be constant, as I have since observed it in several other cases.

I have treated two cases of elephantiasis of the lower extremities by general light-baths with distinct improvement, while a case of elephantiasis of the face ("solid œdema of the face") was not appreciably changed.

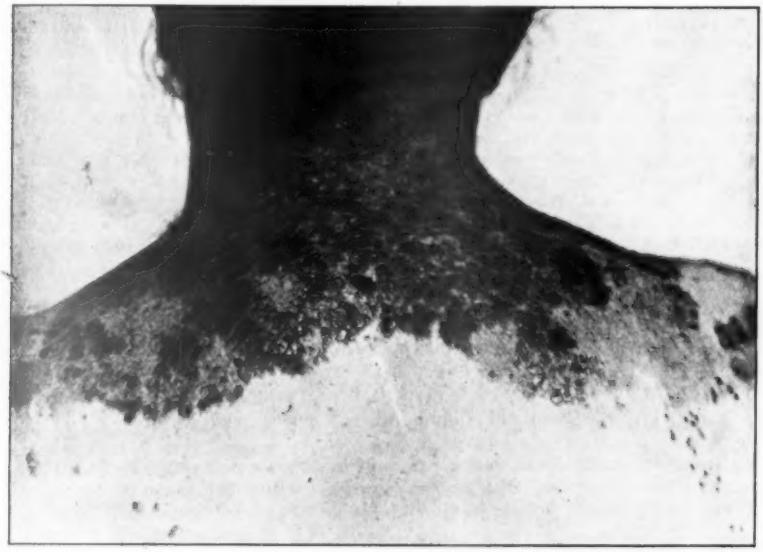

FIG. 12.—Psoriasis. Eruption caused by the sun's light.

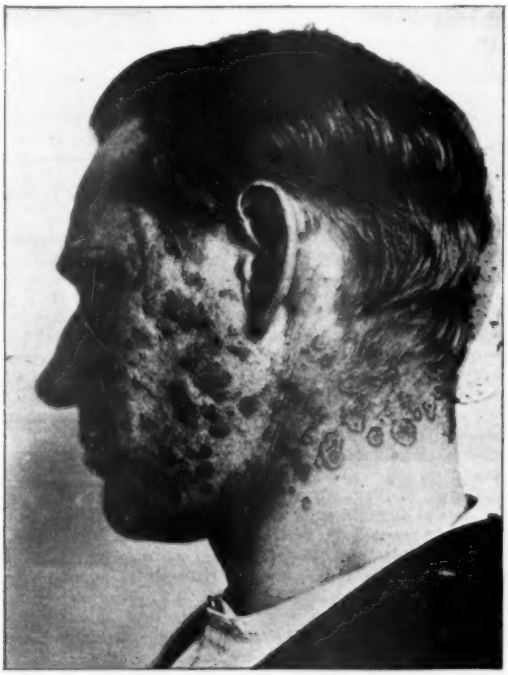

FIG. 13.—Erythema multiforme (eruption evoked by the light).

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The fact that lichen planus is favourably influenced by light first came into prominence in a discussion following my address on the treatment of this disease at the Congress of Scandinavian Dermatologists, held at Copenhagen in 1910, when Afzelius and Marcus each reported a case in which the patient had been completely cured by a light cure instituted by himself. I have since employed this treatment myself with a very good result in four difficult and protracted cases of lichen planus. Two of the patients were cured with natural sun-baths in about five weeks; the other two were practically cured with artificial light-baths in the same length of time. One (the fifth) patient was almost unaffected, but he was not pigmented by the light either. A (sixth) fresh case was completely cured by seventeen light-baths.

It thus seems as if pigmentation, just as in the light treatment of tuberculosis, here also plays a part, and that the action is not only a local one on the skin but is due to changes in the entire organism. This fits in with the view which I take of the nature of the disease, for I regard it as a general disease in which, at any rate in all the extensive cases, blood changes and widespread glandular swelling can be demonstrated. This action of the light on lichen planus might also explain the fact that, even in very widespread lichen planus cases, you never see an eruption on the face.

I will now bring to a conclusion these rather disjointed remarks on the action of light on the skin and skin diseases on account of the shortness of the time. The scope has really been too comprehensive for an hour's lecture, and I have not been able to touch upon many interesting questions. Much of what I have said is already known to you, but I thought it would interest you to know that in Copenhagen, where Finsen's fundamental work on light-therapy was done, those of us outside the Finsen clinic are also on the look-out for the effects of light on the skin. The reason that we see so many of the harmful effects is partly due to a mistaken conception of light-therapy, for many people think that as much light as possible is good for all people and for all diseases.

BIBLIOGRAPHY.

ADAMSON, H. G., "On cases of Hydroa æstivale of mild type; their relationship with Hutchinson's 'Summer Prurigo' and with 'Hydroa vacciniforme' of Bazin," *Brit. Journ. Derm.*, 1906, p. 125. ANDERSON M'CALL, "Hydroa vacciniforme," *Brit. Journ. Derm.*, 1898, p. 1. BARLOW, "Treatment of Small Pox," *Lancet*, 1871, i, p. 9. BESNIER, ERNEST, "Deg. colloïde du derme," *Annales Derm. et Syph.*, 1878-79. BEINHAUER, "Urticaria solaris," *Arch. f. Derm. u. Syph.*, 1925, xii, p. 62. BELLINI, ANGELO, "Influenza della luce nella etiologia dell' epithelioma cutaneo," *Giorn. ital. d. Malatt. ven. e de Pelle*, 1909, p. 752. BLACK, "Preventing of Pitting by Small Pox." *Lancet*, 1867, i, p. 792. BOWLES, ROBERT L., "On the Influence of Solar Rays on the Skin," *Brit. Journ. Derm.*, 1893, p. 237. *Idem*, "Sunburn on the Alps," *Alpine Journal*, November, 1888 (also pamphlet, published by Stanford, of Cockspur Street). CAPPELLI, J., "Caso singulare di Hydroa vacciniforme con ematoporfirinuria ed ipertricosi," *Giorn. ital. d. Malatt. ven. e de Pelle*, 1914, p. 481. COLHOUN, "Experiments on the Sensibility of the Surface of the Face to Light," *Amer. Med. Recorder*, Philadelphia, 1823, vi, p. 63. CRANSTON LOW, R., "The Association of Eye Lesions with Rosacea," *Brit. Journ. Derm. and Syph.*, 1922, p. 275. DUBREUILH, W., "Elastome diffus de la peau," *Annales de Derm. et Syph.*, 1913, p. 193. DUBREUILH, W., "Du rôle de la lumière dans l'étiologie de l'épithéliome de la peau," Congress in Rome, 1912, p. 33. DUBREUILH, W., "Épithéliomatose d'origine solaire," *Annales de Derm. et Syph.*, 1907, p. 387. DUKE, "Urticaria caused by Light," *Journ. Amer. Med. Assoc.*, 1923, lxxx, p. 1835. EHRMANN, "Hydroa aestivale," *Archiv f. Derm. u. Syph.*, 1905, lxxvii, p. 163; 1909, xcvii, p. 75. FINSEN, "On the Injurious Effect of the Chemical Rays on the Animal Organism," H. T., 1893, p. 1069 (in Danish). FINSEN, "Remarks on the Red-light Treatment of Small Pox," *Brit. Med. Journ.*, 1895, ii, p. 1412. FREI, "Urticarielle Hautreaktion auf Sonnenlicht," *Archiv f. Derm. u. Syph.*, 1925, cxlix, p. 124. GAGEY, "Cas d'hémoglobinurie au cours d'un xeroderma pigmentosum," Thèse de Paris, 1896. GALLOWAY, Sir JAMES, "Diseases of the Skin produced by Occupation" (in Allbutt's "System of Medicine," ix, p. 81). GRAY, A. M. H., Hæmatoporphyria congenita with hydroa æstivale, *Proc. Roy. Soc. Med.*, 1923-24, xvii (Sect. Derm.), p. 20; *Brit. Journ. Derm. and Syph.*, 1924. GROSS, "Hydroa vacciniforme," *Archiv f. Derm. u. Syph.*, 1910, cv, p. 266. GÜNTHER, "Die Hämatoporphyrie," *Deutsch Arch. f. klin. Med.*, 1912, cv, p. 89.

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Idem, "Die klinische Symptome der Lichtüberempfindlichkeit," *Deutsche med., Wochenschr.*, 1919, p. 177. HASLUND, P., "Hämatogenes tuberkulöses Exantem," *Archiv f. Derm. u. Syph.*, 1916, cxxiii. HAUSMANN, WALTHER, "Lichtbiologie und Lichtpathologie," Berlin, 1923. HAXTHAUSEN, HOLGER, "Skin Diseases called forth by the Light," Copenhagen, 1919 (Danish). HAXTHAUSEN, HOLGER, "Tilfælde af Riehls Sygdom," Danish Dermatological Society, 158 Möde, 4 Maj, 1921. HAXTHAUSEN, HOLGER, "Kolloidmilium und Talgkirtelhyperplasi," Danish Dermatological Society, 189 Möde, 6 Maj, 1925. HAZEN, GEO. F., "Exposure to the Sun as an Ætiological Factor in Alopecia," *Journ. Cutan. Dis.*, 1911, p. 166. HEGLER, FRÄNKEL und SCHUMAN, *Deutsche med. Wochenschr.*, 1913, p. 842; 1916 p. 1242. HYDE, "On the Influence of Light in the Production of Cancer of the Skin," *Amer. Journ. Med. Soc.*, 1906, cxxxi, p. 1. JADASSOHN, "Cutis rhomboidalis nuchæ mit colloider Degeneration," *Zentr. f. Haut u. Geschlechtskrankh.*, 1925, xvii, p. 272. KELLER, PH., "Lichtempfindlichkeit bei Pemphigus acutus," *Derm. Wochenschr.*, 1924, No. 44. KISSMEYER, "Teer-melanose," *Archiv f. Derm. u. Syph.*, 1922, cxl, p. 357. KISSMEYER and C. WITH, "Pathological Changes in the Elastic Tissues of the Skin," *Brit. Journ. Derm. and Syph.*, 1922, pp. 175, 221. KREIBICH, "Sclerodermieartige Lichtdermatose," *Archiv. f. Derm. u. Syph.*, cxliv, p. 454 [this case seems to me to be a variety of xeroderma pigmentosum]. KÖNIGSTEIN und HESS, "Bisher nicht beobachtete Form von Hautgangrän," *Dermat. Zeitschr.*, 1910, xvii. LINSER, "Hydroa æstivale und Hämatoporphyrinuria" (Aus d. med. Klinik in Tübingen), *Archiv f. Derm. u. Syph.*, 1906, lxxix, p. 251. LOMHOLT, "Xeroderma pigmentosum beh. med. CO_2," Danish Dermatological Society, 118 Möde, November, 1916. MACKEY, L., and Sir A. E. GARROD, "On Congenital Porphyrinuria associated with Hydroa Æstivale and Pink Teeth," *Quart. Journ. Med.*, 1922, xv, p. 319. MOLEITR, "Kongenitale Porphyrinurie," *Münch. med. Woch.*, 1923, p. 1376. MONTGOMERY, DOUGLAS, "Unusual Exposure to Light followed by Seborrhœic Keratosis," *Journ. Amer. Med. Assoc.*, 1913, lx, p. 7. MOELLER, MAGNUS, "Der Einfluss des Lichtes auf die Haut in gesundem und krankem Zustand," *Bibliotheca medica*, 1900. NIELSEN, L., "Tilfælde af Lysudslet," Danish Dermatological Society, 12 Möde, Maj, 1900, H.T. 1900, p. 646. NIKOLSKY (ROSTOW), "Cutis rhomboidea hypertrophica cervicis," Act. dermato-ven. Russica., Tome III (abstr.), *Zeitschr. f. Haut. u. Geschlechtskrankh.*, 1925, xvii, p. 272. NIKOLSKY, *Russkij westnik dermatol.*, 3, No. 2, 1925. OBERMILLER, "Ueber Lichen ruber planus cum pigmentatione," *Archiv f. Derm. u. Syph.*, 1922, cxlii, p. 252. OCHS, "A Case of Urticaria caused by the Sun's Rays," *Med. Record*, July 30, 1910, p. 193. ORMSBY and MITCHELL, "L. Erythematodes with an extensive Eruption on the Trunk," *Archives of Derm. and Syph.*, 1924, ix, p. 272. PELLIZARI, CELSO, "Pseudo-milio colloidale," *Giorn. ital. d. Malatt. ven. e delle Pelle*, 1898, p. 692. PETERSEN, HJ., "2 Tilfælde af Pityriasis versicolor," Danish Dermatological Society, 104 Möde, Nov. 4, 1914. PICK, "Umwandlung einer Lichtdermatitis in Psoriasis," *Zeitschr. f. Haut. u. Geschlechtskrankh.*, xi, p. 127. PICTON, "On the Exclusion of Light as a means of Preventing the Pitting in Smallpox," *Amer. Journ. Med. Sci.*, 1832, p. 119. PIORKOWSKI, FRANZ, "Cutis rhomboidalis nuchae mit kolloider Degeneration," *Archiv f. Derm. u. Syph.*, 1926, cl, p. 376. PIORRY, *Méd. pratique*, 1848, vii, p. 495. PIRILÄ, "Lichen ruber. Fall mit einer frühzeitig auftret. intensiven Pigmentation," *Dermat. Zeitschr.*, 1918. PULAY, ERWIN, "Stoffwechselpathologie u. Hautkrankheiten," *Derm. Wochenschr.*, 1921, lxxiii, pp. 1217 and 1245. (Case of L. Erythematodes called forth by the Light.) QUATTRINI, "Eritrodermia recidivante provocati dai raggi solari," *Giorn. ital. Malatt. ven. e de Pelle*, 1923, p. 853. RASCH, C., "Hydroa vacciniformis," H. T., 1898, p. 771; "Prurigo æstivalis," Hutchinson, H. T., 1898, p. 1094; "Hydroa vacciniformis," Danish Dermatological Society, April, 1899, H.T., 1899, p. 506; "Dermatitis herpetiformis and Hutchinson's Prurigo," Danish Dermatological Society, April, 1901, H.T., 1901, p. 628; "Klinische u. therapeutische Bemerk. über Lichen ruber" (Diskussion), 1st Congr. of Northern Dermatologists in Copenhagen, 1910, *Nord. Med. Ark.*, 1911; "Hydroa vacciniformis," Danish Dermatological Society, Maj, 1912, H. T., 1912, p. 1569; "Elephantiasis behandlet med. universelle Lysbade," Danish Dermatological Society, November, 1920; "Diseases of the Skin (Hudens Sygdomme)," 3rd ed., fasc. ii, Copenhagen, 1926, pp. 243-259 (Danish); "On a Polymorphic Light-eruption" (Danish), Danish Dermatological Society, 11 Möde, April, 1900; "Light-treatment of Lichen Planus" (Danish), Danish Dermatological Society, April, 1926; "Effect of the Sun's Light on a Syphilitic Eruption," *Brit. Journ. Derm.*, 1921, p. 56. RASCH, C., and KISSMEYER, "Atypisk Lichen ruber," Danish Dermatological Society, December, 1916. RAYNAUD, PAUL, "Erythèmes produits par la lumière," Thèse de Lyon, 1892. RIEHL, "Ueber eine eigenartige Melanose," *Wien. derm. Gesellsch.*, Mai 24, 1917; and *Wien. klin. Wochenschr.*, 1917, p. 780. SHEILD, MARMADUKE, "A remarkable Case of Multiple Growths of the Skin caused by Exposure to the Sun," *Lancet*, 1899, i, p. 22. SCHULTZ, J. H., "Ein Fall von Pemphigus leprosus, kompliciert durch Lepra visceralis," Inaug. Diss. Greisswald, 1874. THIBIERGE, "Mélanodermie de guerre," *Annales de Derm. et. Syph.*, 1925, p. 705. TOYAMA, "Congenital porphyrinuric Anæmia," *Japan Journ. of Derm. and Urol.*, 1923, p. 440. VOLLMER, "Ueber hereditäre Syphilis u. Hämatoporphyrinuria," *Archiv f. Derm. u. Syph.*, 1903, lxv, p. 221. WARD, S. B., "Erythema and Urticaria caused by the Sun's Rays," *New York Med. Journ.*, 1905. WATERS, "Action of Light in

Smallpox," *Lancet*, 1871, i, p. 514. WEISS, H., "Zur Kenntnis der Porphyrinkrankheiten," *Deutsch. Arch. f. klin. Med*, 1925, cxlix. WHITE, J. C., "Hydroa vacciniforme," *Journ. Cutan. and Gen. Urin. Dis.*, 1898, p. 514. WITH, CARL, "L.e. called forth by the Light," Danish Dermatological Society, February and October, 1918 (Danish); "Studies on the Effect of Light on Vitiligo," *Brit. Journ. Derm.*, 1920, p. 145; "An Eruption of Lupus Erythematodes on the Breast and Upper Arm, caused by Carbon Light-baths in a patient with L. erythematodes on the Face," *Nordisk dermat. Forenings*, 4 Möde, Copenhagen, 1919 (Transactions, p. 130).

Section of Electro-Therapeutics.

President—Dr. G. B. BATTEN.

Men, Booms, Steady Progress.

PRESIDENT'S ADDRESS.

By GEORGE B. BATTEN, M.D., C.M.Edin., D.M.R.E.Camb.

YOU will, no doubt, forgive me if my address is drawn chiefly from my personal observations and not from the study of learned writings. Ever since I was a boy of ten I have been interested in electricity. I remember playing at that age with a small ½-in. Rhumkorff coil, some bichromate batteries and some small Geissler vacuum tubes. Later, I heard the first lecture given in this country on Graham Bell's telephone, in Plymouth Guildhall, in 1877. I remember the childlike joy of Lord Kelvin (then Sir William Thomson) when, on that occasion, he was asked to speak through the telephone. He said, "'Hi diddle diddle the cat and the fiddle'; go on with that," and then he listened and, fairly dancing on the stage, he cried, "I heard them say, 'The cow jumped over the moon.'"

Within two months afterwards I had made a pair of telephones for myself, and as secretary of the Natural Science Society of my school, Haileybury College, I gave a lecture on the telephone! About the same time I set up a battery of Grove cells and worked an arc light which then was quite new.

I remember when almost the only use that was made of electro-therapeutics in hospitals and in practice was the treatment of paralysis and pareses by galvanism and faradism, and the testing for the reaction of degeneration. The popular apparatus was the hand-worked electro-magnetic machine and the small shocking coil.

Although the beginning of electro-therapy with static machines is centuries old, the medical practitioners who specialized in this subject were very few indeed: I remember the names of De Watteville, Charcot, and Morton, of New York, and the personalities of W. S. Hedley, H. Lewis Jones, Donald Baynes, H. M. McClure, Samuel Sloan, d'Arsonval and others.

Although Tesla's discovery of high frequency and d'Arsonval's application of it to therapy preceded by a few years the discovery of X-rays by Röntgen in November, 1895, it was chiefly the spectacular use of X-rays in surgery that started and has maintained the great interest and advances that have been made in all forms of electro-, radio- and physico-therapy, during the last thirty-one years.

Now, practically all our hospitals—teaching, general, special, municipal, and cottage,—and also clinics, have their X-ray and electro-therapeutic departments, and there are literally hundreds of qualified medical men practising electro-therapy in Great Britain alone, besides a host or horde of more or less efficient assistants, operators and nurses.

After the discovery of X-rays I very soon began to experiment with them, and early in 1897 acquired a 6-in. Miller coil and one of the earliest Jackson Cossor focus tubes and took many radiographs.

I worked either directly off an alternating current with a Caldwell electrotype

break, or off accumulators. I also, at this time (1897), used high frequency with an Oudin resonator made by Dean, and radiant baths from vacuum lamps.

Though not approaching Mr. Thurstan Holland in length and amount of experience, I believe I may claim to be the oldest, or one of the oldest, radiologists still practising in London. I have had much experience as radiologist to a children's hospital, also at L.C.C. clinics, and, of course, at a military and other hospitals during the war, and in general practice. As a member of the Röntgen Society since 1899, of the British Electro-Therapeutic Society, which afterwards became this, the Section of Electro-Therapeutics of the Royal Society of Medicine, and more recently the British Association of Radiology and Physico-therapy, which has become the British Institute of Radiology.

I may claim that we all have desired and worked whole-heartedly all the time for the improvement not only of the position of medical electrology both within the profession and with the public, but also have endeavoured to make all our increases in knowledge and technique available for the good of mankind, to relieve disease and distress, increase comfort and avert the tendency to death which, after all, is our chief function as physicians.

The proposed amalgamation of the Röntgen Society with the British Institute of Radiology, with a view to the closer association of medical men, physicists, manufacturers, radiographers and others, will, I believe, help in this good work; and I hope that, with your help, I may be able to do my best towards promoting the purity and helpfulness of the practice of electrology, which includes, of course, all forms of radiology.

My long experience has impressed many things on my mind, and I wish particularly to draw your attention to two of them.

The first is, that the man is more important than the machine.

The second is, that most of the progress in medical electro-physics and therapy, used in its widest sense, has been due to a combination or sequence of events, namely:—

(1) Some discovery or basic improvement in knowledge. (2) Steady work about this discovery or improvement in knowledge. (3) A boom connected therewith. (4) A comparative slump. (5) Careful research and further steady work. (6) Retention and use of the really efficient modalities in diagnosis and treatment due to the discovery, and the "scrapping" of those which are false or of little use.

Let us think of the truth of these two impressions under the following headings, roughly in the order of their seniority in time:—

(1) Electro-therapy proper. (2) High frequency and diathermy. (3) X-rays. (4) Radium and radio-active substances. (5) Heat and light treatment.

(I) Electro-therapy.

It is impossible for me to give an historical review of the truth of my two impressions in the first of these, that is, electro-therapy proper. Though the existence of electricity dates from thousands of years ago when amber (Greek, "electron") was rubbed, and sparks and other effects produced, yet not much advance was made until Benjamin Franklin, in about the year 1746, carried out his experiments on atmospheric electricity followed by the use of lightning conductors. Then further advances occurred after Alessandro Volta produced the voltaic battery in 1774, and soon afterwards, in 1791, Luigi Galvani discovered the effect of the voltaic or galvanic current on a frog's leg.

These discoveries made by these men of genius and their observation of matter and material that had always existed, led, no doubt, to some booms in treatment, partly by the few who understood, but much more by the quack and charlatan who exploited them for their own benefit.

In 1812 and onwards, Michael Faraday made his long series of experiments on induction; this led to the invention of magnetic machines and dynamos, on which depend practically all our present supplies of electric current, industrial and medical. Faraday was the man and his was the brain on which depended the machine. It has been said with reason that the two million workers in this country alone, who are dependent upon electrical industries, are living on the brain of Faraday. Much work following his discoveries was done by Clerk Maxwell, Ohm, Watt, Joule, Hertz, Lord Kelvin and others too numerous to mention. This led to a boom in the uses of the electric current, especially for industrial purposes such as the telegraph, electric light, electric motors and electric traction. In medicine it led to the greatly increased use of the electric current and a decided boom in the use of static, galvanic and faradic currents for all sorts of conditions with real and imaginary benefits. The saying, "electricity is life," became a popular though erroneous slogan. Many charlatans exploited this boom by the use of electric and magnetic belts and other, mostly useless, appliances.

Nevertheless, steady work went on. The real usefulness of various electric currents in testing for evidences of paralysis, in treating these successfully and in mitigating pain was established. Good work was done, among others, by men I have mentioned, De Watteville, Charcot, William J. Morton, W. S. Hedley, Lewis Jones, S. Sloan, d'Arsonval, Bergonié, Bordier and Leduc. Medical electro-therapy was thus put on a fairly scientific basis. But gradually it was used less and less, and a slump followed, due no doubt to its previous booming by quacks, so that it became almost a byword in the profession.

After the discovery of the X-ray, however, such a great increase of interest and knowledge of electrical matters followed that much further patient work was done. The practice of electro-therapy was revived both in hospitals and in private by a large number of highly educated men. In fact, a further and honest boom is in progress. The success of its various modalities and the diseases for which they are used will at once call to your experienced minds not only the methods used, the successes attained, but also the names and personalities of the men who command these successes in electro-therapy. For instance, think of a well-known coil with a double-barrelled name and of its designer, and the artistic and almost caressing way in which he uses it to treat a sprained joint, or of another expert who uses this, or a similar apparatus, to cure flat-feet, or again of someone whom we know, with a bougie or electrode in his hand ready to treat some long-standing suppuration. Contrast these with the comparatively crude, or at any rate, thumb-rule methods of the multitude of the less skilled, or of the lay workers. The machines are the same but the men vary and so do their results.

(II) High Frequency and Diathermy.

The second of the modalities I wish to consider is that of high frequency and diathermy. These are, of course, methods used in electro-therapy, but they form almost a distinct branch, at any rate they have a distinct history of their own. These undulatory currents of high frequency were discovered by Feddersen and studied by Helmholtz, Kelvin, Hertz and Joubert and were applied to therapy by d'Arsonval in 1888. The effects were at first obtained by suitably putting the current from the Hertz and other static machines through Leyden jars.

In 1891, the American engineer Tesla brought forward his apparatus for getting large currents of high frequency from coils, transformers and condensers; this apparatus was next year simplified by Elihu Thomson, and d'Arsonval was enabled to use them in treatment. Almost at once, these currents of one or more horse-power which Tesla took through his body, unscathed, made an appeal to the public and there was a veritable and widespread boom in high frequency. By the use of an

Oudin resonator, high frequency was applied by medical men, of whom I was one, by laymen and quacks, for the relief of almost every kind of painful and chronic complaint. Even the notorious Bodie used it on the music-hall stage.

At a meeting of the Society of Journalists in honour of Sir William Preece, when the evening papers were "booming" high frequency, I took the opportunity of asking the journalists present not to extol it, as this would undoubtedly lead to disappointment and prevent the application of high frequency to those cases for which it would be found most useful. This over-exaltation of the method, however, persisted, and in spite of many excellent results the use of high frequency fell almost into disrepute, and a definite slump occurred. However, Sloan and many other earnest workers continued the investigation of high frequency and found out its method of action in the tissues, chiefly by heating them.

During and after the war, the introduction of wireless installations and the invention of thermionic valves led to further work with high frequency in physiology and therapy, as by Philippe, of Belgium. Another, but more restricted, useful boom followed and has continued. But, as usual with booms, all sorts of small comparatively useless outfits have been made and advertised, not only for high-frequency currents but for the falsely so-called ultra-violet light that their vacuum electrodes are supposed to give off.

I need not enumerate the many successful uses of high frequency to you, but I will mention one which is not widely enough known to the medical profession. I refer to the use of high frequency in treatment of hæmorrhoids, which I and many others have used successfully for thirty years as an almost certain and immediate palliative, and in some cases as an actual cure, for this distressing complaint. To notice the extreme distress and pain of a patient who comes to one with "an attack of piles," and see this patient's comparative comfort after twenty minutes' high-frequency treatment with a conical vacuum or a metallic electrode is one of the most gratifying things in electro-therapy.

The use of ordinary high frequency with damped oscillations, first with a single spark-gap and then with the multiple spark-gap, led gradually to the use of undamped oscillations. These were, I believe, first experimented with in wireless telephony, but were soon used in treatment and are now known as diathermy.

Much work was, and is, being done in perfecting the best forms of diathermic machines; a boom in diathermy is now in progress, especially in America, and I have no doubt will soon be followed by a really useful popularity in this country. I do hope, however, that the power of diathermy for evil as well as good will prevent the unskilled worker and the quack from venturing upon its exploitation.

Surgical diathermy with the cold cautery, as it is called, has found a most useful place and has been much used even in this country, especially in the removal of growths in places difficult of access, such as the larynx and bladder.

Medical diathermy has also proved very useful, and, as you know, Dr. Eaton Stewart recently gave us details of its use and success in America in treatment of pneumonia.[1] For this purpose we are still waiting for a British-made powerful, portable, reasonably-priced diathermy machine, by means of which we can treat and help to cure patients with pneumonia in their own homes, where most of these cases occur. This is a really urgent need.

As you will notice in the Calendar of the Royal Society of Medicine, we have arranged for a joint discussion on diathermy by our Section and the Section of Surgery. I hope we shall also have the co-operation of the Medical and other Sections. It is likely that later on there will be a decline in the use of diathermy, but lessened, I hope, if this boom can be kept out of the hands of the inexpert.

[1] *Proceedings*, 1926, xix (Sect. Electr.), p. 53.

(III) X-RAYS.

I must now consider what I think we will all agree to be the most important division of our work, namely, radiology; meaning by radiology, for the moment, the use of X-rays.

As you know, Sir William Crookes, in this country in the late seventies of the nineteenth century, did much pioneer work in electric discharges *in vacuo*. He demonstrated the cathode stream, and in 1879, although he did not realize it, he actually produced photographic shadows of some wire gauze and metal strips by this cathode stream which were in reality the same things as X-ray photographs. Professor Röntgen, working on lines made possible by Professor Crookes's work, discovered the X-rays and published his results in November, 1895. Within a few hours after this publication, Campbell Swinton took a photograph of a hand, showing the bones, with a Crookes's tube. It was not long before Sir Herbert Jackson added the anticathode or target, giving a focus point from which the X-rays were emitted, and so made a scientific discovery leading to a practical means of diagnosis and treatment.

In much the same way as Professor Hughes, through adding the microphone to Graham Bell's telephone, had made it a useful and commercial instrument, so Marconi, by his invention of a simple coherer, made practical the previous experiments of Hertz and Sir Oliver Lodge in wireless telegraphy, which has led to the vast expansion of "wireless" all over the world.

Röntgen's discovery and Herbert Jackson's focus tube were used almost at once in surgery, in 1896, by Thurstan Holland, Macintyre and a few others, and by 1897 many more of us were using them; as I have mentioned, I obtained a 6-inch Miller coil with hammer-break and this Jackson focus tube. At my house only alternating current was available, so I worked this coil off accumulators, and then soon afterwards replaced this with a Caldwell electrolyte break, worked directly off the mains. I show you a photograph taken with this in 1897. I regret that I did not keep some that were better than this. I exhibit two of the many that I took in 1898 with the same apparatus. At present we are rather glad to have alternating current in our consulting rooms, but at that time it was a decided nuisance. In 1900, with the help of my friend, the late Mr. George Sutton, we designed and patented a rectifier from the alternating current to the direct current worked as a relay. I showed this among other apparatus when I read a paper on a system of heat, light, X-ray and electro-therapeutics worked from the alternating mains in March, 1903; the paper was published in *Medical Electrology and Radiology*, vol. ii, No. 2, April, 1903.

But this is enough record of my early workings. The Röntgen Society was founded in 1897, with Professor Silvanus Thompson as its first President, and is the original and oldest Röntgen Society in the world. The members of the Röntgen Society are medical men, physicists and manufacturers, all of whom are interested in radiology, and each of them has taught and learnt from the others. This has resulted in a general increase of knowledge and rapid steady progress which could hardly have otherwise been attained. I can testify that the Röntgen Society and its members have done much really good useful work during the twenty-nine years of the society's existence, for I have been a member of its council for over twenty-three of those years.

From the dignity of this chair I should like to take the opportunity to say that although not all of us realize it, the Röntgen Society is held in great honour and respect throughout the world of radiology and physical science. Its list of presidents contains the names of many men most eminent in science or medicine, and its publications have maintained a high standard throughout.

In 1901 some members of the Röntgen Society felt that they would like a society

devoted only to medical matters, and though I believe they were misguided in thinking that this could not be attained inside the Röntgen Society, yet they founded the British Electro-Therapeutic Society. Among those prominent in doing this were Dr. Chisholm Williams, Dr. Lewis Jones, Dr. Reginald Morton, Mr. C. C. Lyster, Mr. Hall Edwards and Dr. W. S. Hedley, who was its first president.

The Proceedings of the British Electro-Therapeutic Society were published in the *Journal of Medical Electrology and Radiology*, which had succeeded *Physical Therapeutics*. In *Physical Therapeutics*, January, 1901, there appeared one of the original papers by Niels R. Finsen on "New Researches concerning the Action of Light upon the Skin." There was also an important paper by Paul Renaud, of Paris, on high-frequency currents. The number for April, 1903, contained papers by H. S. Boardman on X-ray treatment of sarcoma; also references by W. J. Morton, of New York, and others on X-ray treatment of malignant disease. And again there was a paper by myself on a "System of Heat, Light, X-ray and Electro-Therapeutics, worked from the Alternating Mains," in which, among other things, I described my rectifier, to which I have already alluded, and also the results of treatment by X-rays of lupus, rodent ulcer and especially a case of recurrent nodules after removal of the breast for carcinoma by Mr. Jonathan Hutchinson. The patient died eighteen months afterwards from acute blood-poisoning from a mosquito bite, and I excised one of the treated nodules and had it examined microscopically; all cancerous cells had disappeared, and had been replaced by fibrous tissue. I published a photograph of this section in the *Archives of the Röntgen Ray*, about 1904.

In the December number of the *Archives*, 1907, we have recorded the reception of the British Electro-Therapeutic Society into the Royal Society of Medicine as one of its original sections, and so this Section was born; Sir William Church, at the first banquet of the Royal Society of Medicine, referred to our Section as "being concerned with a branch of study which is destined to be of great importance in medical work."

During more recent years and since the war Sir Archibald Reid, Dr. Robert Knox and many others thought that, as the work of the Röntgen Society was chiefly scientific and that of this Section was academic, and necessarily non-political, and could not devote its energies to any problems of propaganda or education, there was room for yet another society which could act as the liaison between all the various interests connected with medical electrology and radiology. So the British Association of Radiology and Physico-therapy, the B.A.R.P., came into existence, and had a very active and successful career. Its first president was Sir James Mackenzie Davidson. It published the *British Journal of Radiology*, and by its efforts succeeded in inducing the University of Cambridge to institute a Diploma in Medical Radiology and Electrology. It helped the radiographers and did much for systematic education by instituting courses in radiology and electrology. Dr. Stanley Melville, in particular, has devoted much excellent work to the furtherance of these two matters.

Then the Institute of Radiology was formed. The late Sir Archibald Reid was prominent in its formation, and through his astuteness the British Institute of Radiology obtained a very good habitation at 32, Welbeck Street. The British Association of Radiology and Physico-therapy merged itself into the British Institute of Radiology, which has, I think, been booming, especially during the last eighteen months. The first president of the British Institute of Radiology was Sir Humphry Rolleston, with Sir Archibald Reid as chairman, and its secretary is our indefatigable friend, Dr. John Muir.

The three Societies, the Röntgen, the Electro-Therapeutic Section and the British Institute of Radiology together promulgated and brought to a most successful, and

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even brilliant issue, the First International Congress of Radiology in London last year, under the presidency of our doyen, Mr. Thurstan Holland. We all worked hard for that Congress, attended the meetings, and have since read the papers published in both sections of the *British Journal of Radiology*. We congratulate the executive and the staff on their very capable and energetic efforts, which largely ensured its undoubted success. I published my impressions of the Congress last year in the *Medical World*.

As you know, the Röntgen Society and the British Institute of Radiology have been actively engaged in attempts at amalgamation. Their journals have for some time been published in conjunction with each other: and their respective councils have met again and again and have worked out a joint constitution for amalgamation under the title of the Röntgen Society and Institute of Radiology. It only remains for details of this to be confirmed, or otherwise, by general meetings of the two societies.

Personally, as I have already indicated, I believe in the close association of all interested in radiology: medical men, physicists, and those interested in its industrial aspect. I further believe that the amalgamation and proper "running" of these societies with a worthy all-British combined publication, serving all the various interests connected with radiology, will have great and far-reaching good results. I hope to see this amalgamation attained and secure during the term of my Presidency of this Section.

In work with X-rays perhaps there has been more steady progress and fewer booms and slumps than in other departments of our work. But there have been booms, for example, in diagnosis. The public in the early days and now again, have insisted on being X-rayed for all sorts of things which X-rays could not then reveal, though now they can reveal much more than formerly. Luckily, most of the work in X-ray diagnosis has been in the hands of medical experts who have not given in to these useless demands. There was of course a tremendous, but absolutely honest, boom in the localization of foreign bodies and the diagnosis of fractures during the war—work which in its inception was closely linked with the name of that most lovable of men, Sir James Mackenzie Davidson.

In treatment there have been more booms; first, in use of X-rays for malignant growths and skin complaints. This boom led to investigations and definite progress, though in practice it has become gradually restricted to treatment of cases for which it is really useful. The capacity of X-rays to cause dermatitis and do harm when wrongly used has largely led to its restricted use. Another very definite boom was the X-ray treatment of uterine myomata and the production of an artificial menopause, which was initiated in Frieburg about 1911 and 1912, spread through the world. I heard a German gynæcologist complaining in 1913 at the Brighton Meeting of the British Medical Association that they had no surgery to do at all except operations for appendicitis. This treatment has been, and is, comparatively successful, but the boom was followed by a slump, and has since been succeeded by regular and successful treatment.

Then, of course, there was more recently the great boom of the intensive or Erlangen method of treating malignant growths by the so-called lethal dose, which in many cases was not only lethal to the tumour but eventually to the patient. The sanguine claims and hopes of the Erlangen school were not fulfilled and disappointment caused a comparative slump. However, steady work went on all the time and now the method of dosage with intensive or highly penetrating rays is better understood and better results are being attained in treatment of malignant and other deeply seated growths.

I do not know what results Sir Berkeley Moynihan at Leeds, and others, have been

obtaining by the immediate irradiation by X-ray bulbs actually placed in the site of malignant growths after their surgical removal, and before the skin is sewn up. The method sounds very rational and should be successful.

We must all guard the public from the unwise use of X-rays. As a general practitioner radiologist, I am often requested by patients to use the X-rays in diagnosis or treatment for the most extraordinary complaints. You would be surprised at some of the requests as: "My headaches are chronic, I cannot sleep, will you give me the X-rays?" or "My husband's nerves are awful; will X-rays do them good?"

The progress in technique has been along three chief lines and one minor line. X-ray tubes, coils and transformers, photographic materials, and the minor line of accessories.

Simply reading a description of, or better, looking at, the Röntgen Society's collection of tubes at South Kensington Museum, makes one realize the great advance that has been made from this little platinum Jackson target tube of 1897, through regulating tubes, tungsten target tubes, Coolidge tubes, boiling water tubes, and now the "Metalix" tube and other line focus tubes.

Coils and transformers have developed from small 6-inch coils to huge coils and transformers up to the continuous high voltage outfits, which latter at present are chiefly used in highly penetrative treatments. For diagnosis the period of exposure has been reduced from minutes to fractions of a second.

In photography, plates and films and accelerating screens have all been progressively improved. I expect there are still many marvellous improvements to come in the future, but the double-coated films now in use are really wonderfully good, and a great comfort to work with. We all owe a great deal to that charming eccentric genius, M. Laboshey, who taught us during the war better methods of development.

Among accessories there has been a great advance in couches, screening stands, and tube stands, though in my opinion these are often made too elaborate and complicated. The Potter-Bucky diaphragm helps a great deal and is a most important advance in technique. Methods of protection have rather lagged behind, but the principle of protection near the source of X-rays has gained ground and the new protection afforded by the Metalix tube is a decided advance.

At the Congress last year I could not help contrasting the immense six-feet, quarter-ton, gun-like protection around some of the intensive treatment tubes with the little Metalix tube, only 3 in. in diameter, 21 in. long, and weighing 11 lb. That the progress in the methods of protection has been successful one can see by looking at the hands of the more recent workers and comparing them with the scarred and maimed hands of us older workers of twenty-five and thirty years ago. The use of the kinematograph and series pictures in radiology is finding a definite place; up to the present this new development has been employed by Dr. Case and others in America far more than in this country.

In 1918, in my address to the Röntgen Society, I suggested that an improvement, by means of Dr. Hull's method with kenotrons, might be made in the production of high-tension constant voltage. This has been effected and brought to the fore, as you know, especially during the last two years.

I now suggest that high-frequency currents with damped or undamped oscillations should be efficiently rectified and used to energize X-ray tubes. They are rectified by thermionic valves and other means in wireless work, and if they could be rectified in greater amperage or milliamperage it should lead to much simpler, more powerful, and yet smaller sources of energy for producing X-rays. I know there are difficulties in the way but I believe they should be and will be got over before long.

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Even more important than the improvements in machines has been the advance in knowledge and technique, and this is due to the careful and clever work of individual men; the men have often gone ahead of their machines. I cannot attempt even to enumerate the splendid achievements that have been made, but I can mention the wonderful photographs of gall-stones produced by Thurstan Holland long ago, working with a small 12 in. coil, and similar systematic work on the same subject by Robert Knox; also work on opaque meals by A. C. Jordan and others.

The great and recent advances in X-ray diagnosis due to prolonged investigations were epitomized at the recent Congress by the men who had done the work.

Soon after the Congress I wrote as follows[1]:—

> One was made to realize that some substances, more or less opaque to X-rays, could now be introduced into nearly every cavity of the human body and so made to reveal many secrets. Of course we have had opaque bismuth or barium meals almost since the discovery of X-rays, and the cavities of kidneys, ureters and bladders have been shown up by various bromide salts for many years, but now the ventricles in the brain and wherever the cerebro-spinal fluid penetrates can be shown by the injection into the lumbar spine of various preparations of lipiodol—the uterus, Fallopian tubes in the female, and seminal vesicles in the male can all be shown by the same drug. Pregnancy can be diagnosed in the very early weeks with a knowledge of the position of the fecund ovum in the uterus and this apparently without danger of causing abortion. This was well illustrated by a paper by Dr. C. Heuser, of Buenos Aires. The male urethra can be shown by bismuth or barium.
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> Some few years ago the temporary injection of oxygen into the peritoneal cavity was suggested, and used, for X-ray diagnosis of diseases of the gall-bladder including gall-stones, while the injection of carbonic acid gas into tissues around the kidneys enabled that organ to be well seen. Now our American, Italian and German radiologists have found that if certain preparations of sodium bromo- or iodo-phenolphthalein are injected into a vein, or even taken as pills by the mouth, this "dye," as they call it, gets in about twelve hours into the gall-bladder if it is patent. This dye, being comparatively opaque, can be seen by X-rays, any gall-stones showing up as light areas in the more opaque gall-bladder, and this drug also shows the bile tubes in the same way. Important papers with numerous lantern slides were shown illustrating this by Dr. Bischoff, of Lugano, Dr. Carman, of Rochester, and others.
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> Except perhaps the heart and principal blood-vessels no cavity of the human body seems sacred, even the pericardium I expect has been, or soon will be, safely invaded.

Among the minor achievements in treatment I should like to record the results of some quiet steady work with which I have been concerned. As some of you know I claim to be the originator, in this country at any rate, of the X-ray treatment of ringworm of the scalp; Sabouraud, of Paris, Kienböck in Vienna, Adamson, Critchley, and Agnes Savill in London, all did pioneer work: but I still believe I was the first, for I successfully treated my first case in November and December, 1902, and I published a paper with photographs of cases early in 1904. I wrote another paper in November, 1904, which was published in the *Archives of the Röntgen Ray* in August, 1905, and other papers in 1907 and 1913.

It was not until 1905 that Sabouraud and Noiré perfected their pastilles, and the treatment was taken up systematically in 1906 and onwards, at the London Hospital. Other hospitals followed suit. In 1910 the London County Council began the X-ray treatment of ringworm, first through the hospitals and then in 1911 in clinics of their own, and I was on the committee of the first of these L.C.C. clinics in 1911 at West Norwood.

By the courtesy of Dr. Blake, the Chief Medical Officer of the Health Department of the L.C.C., I am able to give you the following figures:—

[1] *Medical World*, 1925.

10 Batten: *Men, Booms, Steady Progress*

RINGWORM.—LONDON ELEMENTARY SCHOOLS

Year	Fresh cases	Cured cases	Percentage of cures effected by X-ray treatment
1910	about 3,000	?	
1911	6,214	5,872	30
1912	5,311	5,131	37
1913	5,573	5,257	44
1914	4,449	4,904	50
1915	3,747	3,928	47
1916	3,115	3,081	51
1917	2,814	2,964	53
1918	2,639	2,555	51
1919	3,447	3,103	57
1920	3,983	3,856	56
1921	3,473	3,765	61
1922	2,766	2,918	65
1923	2,322	2,395	69
1924	1,724	1,924	70
1925	1,518	1,611	71
1926	331 (Spring term)	306 (Spring term)	74
	372 (Summer term)	418 (Summer term)	80
	56,798	53,988	

The column showing percentages of cures means percentage of cases treated and cured by X-rays out of all cases treated.

You will see that since the beginning of 1910, 56,798 cases have been treated and 53,988 cases cured. Cases of course move away out of the ken of the London County Council and unless they have been previously certified as cured they are not counted among the cures.

The most satisfactory point is that as in 1911, 6,214 cases were treated, 5,872 cured; in 1921 only 3,473 new cases required treatment and 3,765 were cured, and last year the number treated had dropped to 1,518 and the number cured to 1,611. This year as you see the figures will be still less. This is not due to the unpopularity of the treatment as some might suppose, but to a great decrease in the number of cases that occur. By means of our treatment I think we can claim to have cut down the numbers to one quarter in fifteen years.

If we could get hold of the children below school age I believe we might succeed in stamping out ringworm of the scalp, at any rate in London. In 1924, as you will see by this report, children cured by X-rays were able to return to school on an average in 9·7 weeks, whereas children treated in other ways were absent from school for an average of twenty-six weeks. In one clinic where I worked during the same period our average was thirty-eight days; we often cure them in three weeks and then they go back to school in three and a half weeks, though of course it is another eight weeks before the hair grows.

I should here like to congratulate the Royal Infirmary, of Edinburgh, on the successful opening last Saturday by the Duke of York of the finest and best radiological department in the world, and especially congratulate our Vice-President, Dr. Woodburn Morison, on being in charge of this department, also Dr. Knox on his help towards instigating this.

I cannot conclude my remarks about X-rays without performing rather a sad duty. We have lost within my recollection quite a number of the pioneers, due to the evil effects of X-rays which were at first not fully realized.

There was Barry Blacker, who died fairly early in our history from carcinoma of the axilla; then George H. Graham, who died in 1907 rather suddenly, probably from what we know as aplastic anæmia, which also was the cause some time afterwards of the death of Ironside Bruce. Another of our Presidents, Cecil R. C. Lyster, who

bravely carried on nearly up to the end; he, as you know, had previously lost most of his hand and fingers. Sir Archibald Reid's death was not due to direct effects of X-rays, but there is little doubt that his duodenal ulcer and intestinal troubles were increased by X-ray screening. Quite recently the veteran pioneer, Hall Edwards, has succumbed after losing most of one arm and many fingers several years ago. Then among non-medical workers there was the intrepid Reginald Blackall, who continued work so long at the London Hospital: he had treated thousands of cases of ringworm, And now we hear that that enthusiastic chemist, Harrison Glew, has died of pneumonia, but his health had been much reduced owing to severe dermatitis caused by X-rays and radium. Though I do not think he died as the result of exposure to X-rays, yet I cannot refrain from mentioning Sir James Mackenzie Davidson, who had done so much for the X-ray world during his life.

I have no doubt there are others in this country who have given up their lives in pursuit of their profession or work with X-rays and radium. The public call them martyrs to science and I suppose they are, though none of them would, I think, wish to be called martyrs. They were workers for science and workers for themselves and others.

(IV) Radium and Radio-active Substances.

I must be brief in the consideration of the other two sections, the first being radium and radio-active substances. Near the end of last century the Curies discovered radium with its peculiar quality of radio-activity, and this led to a veritable boom in increased and startling knowledge, revolutionizing our ideas about the atom, the elements, and the constitution of matter. This work was done chiefly by our countrymen: Sir Joseph Thomson, Sir Ernest Rutherford, Professor F. Soddy, the Braggs and many others.

Its use in medicine and surgery caused a sensational boom, and great hopes were entertained of the cure of cancer by radium. The public demanded its use in suitable and unsuitable cases and much disappointment followed. Nevertheless, steady work went on, and radium and radium emanations, and more recently thorium emanations, have been and are being largely used in our hospitals, particularly the Cancer Hospital under Dr. Knox and Mr. C. E. S. Phillips; at the Middlesex Hospital under Dr. Lazarus Barlow and Dr. Russ—and of course, at the Radium Institute under Major Pinch; also in private practice as by Dr. Finzi and many of you present to-night.

I believe the best results are being obtained by the combined or consecutive use of X-rays and radium, not only in malignant disease but still more in many less serious but otherwise intractable complaints. Again I emphasize it is not only the radium but the men who know best how to use it that are more important than these powerful reagents.

(V) Heat and Light Treatment.

Lastly, I come to heat and light treatment. These have for centuries been used for treatment of all sorts of chronic and acute diseases. I believe there was a regular boom in light treatment in Austria during the last century.

The modern advance in treatment, however, practically dates from the researches of Niels R. Finsen in 1893 and onwards. The gift of a Finsen light apparatus to the London Hospital by the late Queen Alexandra early in this century, focused medical and public attention on light treatment in this country. Quiet, good work went on, and many improvements were made; I myself had a condenser discharge iron electrode ultra-violet light lamp twenty-five years ago, as well as an arc lamp. More recently the work of Rollier, at Leysin, in Switzerland, of Sir Henry Gauvain, at Alton and Hayling Island, for tuberculosis, and of many others, including Dr. Murray Levick for rickets, has led to one of the greatest booms of all.

The manufacturers are hard at work, they cannot make lamps fast enough to satisfy a public that demands artificial sunlight and ultra-violet rays for every kind of complaint, real and imaginary, while most of them continue to shut out the sunlight from their houses, and filter out the ultra-violet rays by window glass.

The removal of the pall of smoke from over our cities would be the greatest boon to the public. Meanwhile, I believe the boom in light treatment is doing, and will do more good, than harm, but its indiscriminate use by the inexpert will do some harm, and in some cases serious harm. There will no doubt be a slump presently, due to inevitable disappointments. Good work, however, will be done and good results obtained in the long run.

I have not yet had great experience with ultra-violet and other light treatments, but I believe the best effects are being, and will be, obtained by a combination of the more penetrating heat rays—the red and infra-red—with the less penetrating ultra-violet rays. This can be effected by a combination of arc lamps with mercury vapour lamps. However, we shall know more presently, as most of us have this combination.

I hope I have not been wearisome in trying to prove to you what you already know, that man is more important than the machine, and that progress is often attained by discoveries followed by a series of hard work, booms, slumps, and hard work again; and that it is steady intelligent work that attains the best results.

In his Presidential Address to the British Association last year the Prince of Wales said: "Science for the sake of science is a sound principle which should not be disturbed or modified by the quest of gain"; and in a recent book Wyndham Martin wrote: "I understand that a man may have a passion for knowledge which is a burning hunger." Most of us would like to be free and unfettered to feed this burning hunger and to follow knowledge for its own sake, but this is not possible except for a few. There is consolation for us in thinking that probably we may be more human and do the greatest good to the greatest number by taking to heart these words, written in 1907, by Dr. Lewis Jones:—

"The lessons for the future which we draw now, are not new. First among them is the importance of steady, persevering work and the need for a scientific attitude of mind. Now, as always, we can see around us the success of the industrious and careful man, and the failure of the careless.

"Those who work to advance learning to help others will at the same time obtain their own advancement."

Section of Epidemiology and State Medicine.

President—Dr. S. Monckton Copeman, F.R.C.P., F.R.S.

On Immunization against Certain Infectious Diseases.

PRESIDENT'S ADDRESS.

By S. Monckton Copeman, M.D., F.R.C.P., F.R.S.

A Presidential address to this Section might perhaps be expected to afford favourable opportunity for a general retrospect and prospect of public health work, in this country and abroad. But even if time permitted, and one felt equal to such an undertaking, it would be superfluous for me to attempt it in view of the fact that the ground is so amply covered by the recently published Annual Report of the Chief Medical Officer to the Ministry of Health, coupled with the nearly simultaneous appearance of a revised edition of "An Outline of the Practice of Preventive Medicine," also emanating from Sir George Newman's literary and facile pen.

But a recent visit to Bristol, on the occasion of a Public Health Congress in that city, reminded me of the fact that a previous visit, in 1921, on the occasion of an outbreak of virulent diphtheria in the Southmead Infirmary of the Bristol Union, had marked the initiation by the Ministry of Health of investigation into the potential value of the Schick test and of toxin-antitoxin inoculations in connexion with diphtheria prophylaxis.

Recollection of this circumstance leads me to think that perhaps I may best utilize the time at my disposal by a brief survey of methods recently introduced for the purpose of obtaining information as to susceptibility to, and of aiding in, the prevention of certain infectious diseases, particularly diphtheria, scarlet fever, and measles, the incidence of which is a frequent cause of serious mortality, especially in the early years of life.

Immunization against diphtheria, especially as viewed from the administrative side, has formed the subject of interesting papers read before this Section during the past two years, so that it is unnecessary for me to go over again, in any detail, ground which was then well covered.

Reverting for the moment to the work at Southmead Infirmary, in which I had the advantage of being associated with Dr. J. A. Nixon, C.M.G., who had recently been appointed visiting physician to the infirmary, it was necessary for us to feel our way carefully, as neither of us had, at that time, much experience of the practical technique of the Schick test, or of immunization methods, to guide us. Indeed, our first attempt at immunization of a nurse in one of the diphtheria wards —unfortunately, it turned out that she was a serum reactor—somewhat dismayed us, being followed as it was by considerable rise of temperature and malaise on the part of the patient. Happily, however, this case proved to be quite exceptional, and, moreover, we subsequently found that by the simple expedient of commencing with a minimal preliminary sensitizing dose of the toxin-antitoxin mixture, the full dose could be given, twenty-four hours later, even to adults, in whom reaction is usually more marked than in children, without any similar trouble arising.

An account of what was eventually accomplished at the Southmead Infirmary, including details of the technique adopted, was set out in the report on diphtheria, published by the Ministry of Health, a second edition of which is in the press, and need not therefore be referred to further. Suffice it to say that I have recently learned from Dr. Davies, the Medical Officer of Health for Bristol, that since the work was carried out, diphtheria has not again been a source of trouble in the infirmary.

During the next three years, Schick testing, followed by immunization of individuals giving a positive reaction to the test, was carried out on over 4,500 children and adults in various institutions and secondary schools, with the satisfactory result that, with the exception of two specially susceptible cases, none of

these children who had undergone immunization, even when exposed to risk of infection, have subsequently contracted the disease. And, whereas, in one of these institutions, limited outbreaks of diphtheria had, for several years, been the cause of much trouble and expense at intervals of a few months only, since the work was completed—with the added precaution of the immunization, when requisite, of further admissions,—there has been absolutely no recrudescence of the disease.

In the Annual Report of the Metropolitan Asylums Board for last year, reference is made to the increasing prevalence of diphtheria in London. Complacency in regard to this disease, the report states, is certainly not justified in view of the annual loss of life, labour, and money it exacts, quite apart from the personal distress occasioned by it. The attack on diphtheria, it adds, has fallen behind that directed against other infectious diseases with which the Board is chiefly concerned; and the position, though not disquieting, indicates that a more concerted effort should be made to cope with this disease, which is now certainly the most destructive of the infectious diseases met with in Great Britain, and which, at any rate in London, appears to be resisting attack. Notwithstanding the great improvement in diagnosis, standard of living, education in matters of hygiene, and other public health measures, the fact remains that, for reasons not altogether clear, diphtheria appears to be strengthening its forces, and gathering power unchecked by science. There are clear indications that its offensive power is increasing in greater ratio than the defence, and that the time has come for the adoption of measures calculated to restrict the depredations of the disease more effectively than hitherto.

To this end, the suggestion is made that the education authorities should follow the lead of New York, and undertake the testing and immunization by the Schick method of all children of school age. But I would go further, and suggest that it is of even more importance to aim at immunization of all children of pre-school age, in order to obviate appreciable risk of contracting the disease when they come into close contact with other children on joining school. This work has thus far only been attempted on a comparatively insignificant scale in this country, Dr. Hutt having carried out pioneer work in London, while Dr. Benson has been responsible for what has been accomplished in Edinburgh, where, however, I regret to learn, this work has recently come to an untimely end for want of a sufficient staff.

Doubtless, publication of reports (unfortunately justified) as to certain fatalities which occurred in Austria about a couple of years ago, and also of some similar instances at a previous date in America (in consequence of the use for immunization purposes of certain batches of toxin-antitoxin mixture subsequently found to contain excess of toxin) has somewhat naturally deterred various authorities from advocating and arranging facilities for carrying out the work.

Fortunately, however, repetition of such mishaps is, humanly speaking, improbable in future, owing to the fact that anatoxin, which is entirely non-poisonous, has now successfully replaced toxin in the immunizing mixture. But, of course, prejudice once aroused is specially hard to allay, in spite of further advances in knowledge. In England especially, without further official encouragement it is to be feared that progress in the direction I have indicated will be slow; but there is some satisfaction to be derived from the experience of Dr. Robertson and Dr. Benson, in Edinburgh, who reported that whereas consent was obtained for the testing and immunization of 43·3 per cent. of school children, as the result of a first application to their parents, subsequently consent was obtained in respect of 50 per cent. of the remainder. This obviously indicates that parents were satisfied that the children, protected on the first occasion, had not suffered in any way from their inoculation.

In view of the fact that a high percentage of infants over the age of six months are likely to be susceptible, considerable saving of time and energy can be gained by

omission of the preliminary Schick test. Research, moreover, is being directed to the possibility of reducing the three immunizing doses now required to two, or even one, and also of combining a first immunizing dose with the preliminary test. But whenever possible, it is still most desirable, with the object not only of obtaining reliable statistics, but also of safeguarding the individual, to perform a Schick test about three months subsequently to the last immunizing inoculation, as it is known that in a few isolated instances the ordinary procedure may not confer adequate protection, and so may have to be repeated.

Reduction in the number of inoculations requisite for the attainment of an adequate degree of protection would undoubtedly constitute a valuable advance towards more general acceptance of the method on the part of parents, or of public bodies acting *in loco parentis*. But even so, opposition is still likely to be encountered, as there undoubtedly exists widespread objection in many quarters to the adoption of any therapeutic measures involving the use of inoculation methods.

This being so, it is obviously worth while to explore any line of investigation which may conceivably render it possible to attain the desired object without running counter to parental apprehension on the subject of what is popularly regarded as something in the nature of an operation, however slight in actual fact.

Apart from the fleeting placental immunity enjoyed by infants during the first few months of life, it is now a well-established fact that varying numbers of children of school age, when submitted to the Schick test, will give a negative reaction indicative of immunity to diphtheria, the actual percentage varying from 25 or even less, to as high a figure as 75 per cent. according, apparently, to the extent to which they have been exposed to the possibility of minimal but repeated infection. In one instance of a large school population of "remand" children, the percentage of "immunes" considerably exceeded the higher of these figures, notwithstanding the fact that in no instance could a history of previous diphtheria in clinical form be obtained.

In view of these facts it seemed worth while to make an attempt to reproduce, in some degree experimentally, but under conditions free from danger, the circumstances which had presumably been concerned in bringing about the condition of immunity which these children had attained. To this end a preliminary Schick test, with the usual control in each instance, was carried out in a London hospital on eleven children, of ages varying from three to thirteen years. Three days later five of them showed a definite positive, and six a negative reaction.

Treatment of the positive reactors has consisted in spraying, by means of a nebulizer, the nasal and pharyngeal mucous membrane, including the tonsils, with small quantities (about 0·5 c.c. on each occasion) of standardized diphtheria anatoxin obtained from the Pasteur Institute.

These applications of anatoxin—i.e., toxin which has been rendered non-poisonous by Ramon's method of treatment with formalin, but which, as Dr. O'Brien has demonstrated, is nevertheless capable of rapidly inducing a high degree of immunity when *inoculated* into guinea-pigs—were repeated at intervals of from two to four days as occasion served, sometimes after preliminary gargling, and, in certain instances, douching of the nose with a warm, weakly alkaline solution.

Of the five positive reactors, one left the hospital a few days after the preliminary Schick test, on transfer to a convalescent home; while, a fortnight later, two others, most unfortunately, developed scarlet fever and so also had to be removed. Thus two cases only remained for further treatment, but these two when Schick-tested for the second time, after an interval of *three weeks* only, proved to have become absolutely negative. Subsequently two further positive reactors, treated in similar fashion, have become negative, also in about three weeks.

The result of this very inadequate experiment is nevertheless suggestive and, if borne out in further work which is now in progress, may indicate the feasibility of a method of immunization preferable in certain important respects to those at present in vogue.

However this may be, it is certain that we have at our disposal, in the immunization of infants and of those of school age, a most powerful weapon in our fight against the ravages of diphtheria; but much propaganda work will be essential in this country if the desired end is ever to be attained.

Once again, I would advocate most strongly the Schick-testing and, if necessary, the immunization of all nurses employed in fever hospitals, before they are allowed on duty in diphtheria wards. This, I am glad to know, has been the rule as regards, for instance, the staff of the Bristol City Hospital, since January, 1922, with the result, as I am informed, that no completely immunized member of the staff has ever developed clinical diphtheria.

But, as pointed out by Sir George Newman in his last annual report to the Ministry of Health, "there are still many infectious diseases hospitals where nurses are allowed to attend diphtheria cases without having been offered the advantage of this method of protection." He adds that "one large authority calculated that the total cost to the hospital of every nurse who took diphtheria was £28 10s., while the cost of immunizing a nurse was 2/9½d."

Scarlet Fever.

Having dealt briefly with the present position as to the value of immunization against diphtheria, may I supplement this by an equally brief account of work bearing on the question of immunization in connexion with scarlet fever?

In this country scarlet fever is fortunately nowadays a much less serious disease, quâ mortality, than was the case a generation ago, although in America, where the work to which I desire now to refer originated, this disease, at present, ranks as the fifth most fatal ailment in the age group from four to nine years, 74 per cent. of the deaths from scarlet fever occurring in children before they have reached their tenth birthday. In view, however, of the dangerous sequelæ which not infrequently occur, even after comparatively mild attacks of the disease, the possibility of producing artificially, as in the case of diphtheria, a condition of immunity to the disease—and preferably in the pre-school period—will be generally recognized as a matter of the utmost importance. During an official visit to New York about two years ago, I was afforded an opportunity of investigating work in progress on the bacteriology of scarlet fever, on methods of immunization, and on the specific treatment of individuals who have already contracted the disease, which was being carried out on a considerable scale under the direction of the Public Health Department.

The work was, in large measure, concerned with what is known as the "Dick Test," so named after its introducers, Drs. D. F. Dick and Gladys H. Dick, of the McCormick Institute for Infectious Diseases, in Chicago—a test which exhibits many analogies to the "Schick Test" for diphtheria. The original work of these observers has, however, now been considerably extended as the result of the carefully designed researches of other investigators in this country and abroad.

As the outcome of their study of the bacteriology of scarlet fever, the Dicks, apparently confirming earlier results of Klein, Tunnicliffe, Bliss and Mervyn Gordon, claim that a hæmolytic streptococcus, long recognized as a micro-organism constantly present in the naso-pharyngeal cavities of patients suffering from scarlet fever, constitutes the probable ætiological agent of the disease.

But considerable difficulty has been experienced by all who have worked at the subject, owing to the fact that it is practically impossible, by the inoculation of

guinea-pigs, rabbits, mice or other laboratory animals, to produce a disease bearing any definite resemblance to scarlet fever. Various observers have shown, however, that by cultivation of the supposedly specific hæmolytic streptococcus in blood-broth, a toxin can readily be produced, inoculation of which in the human subject is said to have produced some of the main features of the natural disease, including the rash.

This toxin, suitably diluted, is also used for the purpose of the Dick test for determination of the susceptibility or otherwise of individuals to scarlet fever, the test-fluid being inoculated intradermally in precisely the same manner as the solution of diphtheria toxin in performing the Schick test. The results following on the use of this test are also very similar to those observed in the case of the Schick test, except that the reactions appear more rapidly, being at their maximum intensity after an interval of about twenty-four hours, and subsequently also fade more quickly.

Further evidence of possible specificity of the toxin is afforded by the fact that its effects can be completely neutralized by mixing with blood-serum obtained from a convalescent scarlet fever patient, or with the serum of a horse which has been immunized by inoculation with the toxin; and, if serum from either of these sources be injected, intradermally, into the skin of a patient suffering from an early scarlet fever rash, a blanching of the rash over the area of the injection is produced in the course of from six to eight hours subsequently. This phenomenon is known as the Schultz-Charlton reaction.

As regards the extent of the reaction following on the Dick test among children not suffering at the time from scarlet fever, results have been obtained very similar to those well known in connexion with the Schick test. Thus, in the earliest stage of life, a child apparently obtains fleeting placental immunity from the mother, so that up to the age of three months, at any rate, the Dick test is likely to afford a negative result. At subsequent ages the relative proportion of positive and negative results, as in the case of the Schick test, will develop according to age, to social status, and to the child's having been town or country bred.

Some thousands of children in hospitals or infant welfare centres in New York, found to give a positive reaction to the Dick test, have now been inoculated intramuscularly with scarlatinal hæmolytic streptococcus toxin. As in the case of the Schick work, these inoculations have usually been three in number at weekly intervals. These, in the majority of instances, have not given rise to any undue reaction locally or constitutionally.

Again, as in the case of the Schick work, it is important that the results of these inoculations, quâ immunization, should be determined by a further Dick test after an interval of three or four months from the last inoculation.

The results obtained in America have naturally attracted attention in this and other countries; but up to the present, the amount of work carried out with the object of obtaining confirmation of the investigations of the Dicks, of Dochez, and other American observers, though energetically pursued, has hardly been sufficiently extensive to establish the various experimental procedures on a firm basis of scientific fact.

About a year ago the Medical Officers' Committee on Scarlet Fever, appointed by the Ministry of Health, came to the conclusion that it was desirable to carry out intensive investigation into the ætiological relationship of certain hæmolytic streptococci to this disease, and the diagnostic value of the Dick test, this to be undertaken under the co-ordinated direction of a team of expert pathologists and clinicians. It was hoped that the resources of the Metropolitan Asylums Board would also be available to this end, but at the time new arrangements in the Pathological Department of the Board had not come into full working order.

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With the object of ensuring, as far as possible, that the work carried out in the different laboratories should be on strictly comparable lines, it was decided that similar methods and, so far as possible, identical materials should be employed by all the different workers concerned.

The scheme ultimately adopted has comprised, on the clinical side, performance of the Dick test, as a routine measure, on all patients notified as suffering from scarlet fever, admitted to certain infectious diseases hospitals, together with a further Dick test, when possible previous to their discharge.

On the pathological side, throat discharges of scarlet fever patients admitted to these hospitals have been examined for the presence of hæmolytic streptococci, while, for purposes of comparison and control, strains of these micro-organisms of non-scarlatinal origin have also been isolated from various sources, and submitted to thorough investigation in the various laboratories concerned.

Research has been continued up to the present time, and in due course an account of the work accomplished will doubtless receive official publication.

It is essential to bear in mind that the problems connected with the diagnosis of scarlet fever and of immunization against this disease are, in certain respects at any rate, much more complex than in the case of similar work in connexion with diphtheria. Accurate differentiation of the specific micro-organism responsible for the production of the disease in susceptible individuals is of primary importance. In the case of diphtheria, this difficulty has not arisen, for the reason that there has been consensus of opinion on this point for many years past. But in the case of scarlet fever the matter is, at present, quite otherwise, As the outcome of the large amount of research which has been carried out within the past few years, a considerable body of evidence has indeed accumulated in favour of the supposition, now, I see, regarded by Dr. O'Brien as definitely proved, that a hæmolytic streptococcus is to be regarded as the responsible agent. But in the opinion of some observers the variety of strains that have been isolated from the throats of patients suffering from this disease renders it difficult, as yet, to determine precisely whether one particular strain, or of several varying strains, are specially concerned. Again, the divergent results, not infrequently met with in connexion with the classification of hæmolytic streptococci by agglutination and absorption tests, introduce further difficulties. Doubtless, however, experience, gradually accumulated as the outcome of investigations now in active progress in this and other countries, may eventually be expected to elucidate these difficulties.

In reference to the ultimate objective aimed at in the investigations under consideration, there is an interesting point to which sufficient attention has hardly perhaps hitherto been paid. This concerns the nature of the population which it is sought to immunize, quâ degree of susceptibility, as estimated by means of the intradermal test. Experience has clearly indicated, in the case of work on diphtheria, that where a certain general basis of immunity already exists it is comparatively easy to increase the extent of this immunity to a sufficiently high level. On the other hand, in certain institutions, which for years previously had been completely free from this disease, probably owing to the fact that most of the children are recruited from rural areas, we found that immunity was practically non-existent. And, unfortunately, we also found that, in consequence, the building up of a sufficient degree of immunity was a matter of no little difficulty, requiring indeed, as eventually became evident, a time interval more lengthy than had been observed in any of our previous investigations. It remains to be seen whether the response to "immunization" work in scarlet fever will be found to run on similar lines.

And it is, I think, as yet hardly possible to estimate what may eventually prove to be its precise value as compared, for instance, with immunization against diphtheria.

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As a matter of fact, so far as is at present known, attainment of anything like complete immunity by means of inoculation methods appears to be decidedly more difficult of accomplishment in scarlet fever than is the case with diphtheria. Moreover there is unfortunately some reason for believing that any immunity thus produced is by no means permanent. But, in spite of—indeed in consequence of—apparent difficulties, it is obviously essential that further work, both on the clinical and laboratory side, should be pressed on with all possible dispatch. And in view of what has already been accomplished it would appear not improbable that, ultimately, a method for controlling the incidence of scarlet fever, as satisfactory as that which we undoubtedly possess in the case of diphtheria, may emerge from the present experimental work.

Measles.

In the case of measles, as in that of diphtheria and scarlet fever, infants appear to inherit some temporary immunity from their mothers, which is said to last until the fifth or sixth month of extra-uterine life.

From this period onwards, however, up to the age of five years, mortality from measles is high (from 13 to 15 per cent.) mainly due to its complications, a fact which renders desirable some more effective method than "the careful nursing of each case" which at present, as we are told on high authority, constitutes "the only possible way of reducing its mortality." It is therefore of interest to realize that a method of immunization has been worked out during the last few years which has been reported by many observers to be of value in this connexion. The method consists, in its original form, of the subcutaneous administration of small doses of serum from patients convalescent from the disease, obtained as soon as possible following infection. If, however, difficulty should arise in obtaining sufficient "convalescent" serum for the required purpose, advantage may be taken of the fact that antibodies are also present, although in smaller quantity, in the serum of adults who have had measles at any earlier period of their life.

The specific virus of measles is probably, as yet, unknown, although various micro-organisms have been incriminated. Recently, however, Ferry and Fisher claim to have isolated it—a small aerobic, Gram-positive, short-chained streptococcus, which may not improbably prove to be identical with that previously described by Tunnicliffe. They further claim that they have used with success an extracellular toxin produced by this streptococcus for the purpose of a skin test, for the production of an antitoxin, and as a constituent of an efficient immunizing mixture. Should these claims be confirmed by other competent observers, the work of Ferry and Fisher will obviously constitute an important advance on previous work.

The method of immunization by means of "convalescent serum" was first employed by Nicolle and Conseil during a small epidemic of measles in Tunis in 1916, and has subsequently been employed extensively by Park and Zingher, and by Richardson and Conner in America, by Degkwitz in Munich, and by Debré in Paris. Until the end of last year, however, no original work on the subject had been published in this country. Various workers have since modified the original methods of Nicolle and Conseil, and the production of active immunity has been attempted, apparently with some measure of success.

To achieve passive immunity, the following methods of employing the serum are possible:—

(1) Injection of convalescent serum into healthy contacts. In this case an immunity which lasts about a month is produced.

(2) Injection during the first five or six days of the incubation period, when, as Degkwitz and others have shown, the patient will not develop measles: although the later it be injected, the larger will have to be the dose.

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If the serum be injected after the sixth, and before the ninth day, measles will, nevertheless, develop, but the attack will be modified in the length of its invasion period, and by the absence of catarrhal symptoms, Koplik's spots, and high temperature. The eruption also, if present, is less confluent and the macules are smaller. This is the period chosen by Debré for injection with the object of inducing an active immunity.

Injection at the beginning of the period of invasion (about the tenth day) will result only in local inhibition of the rash—the phenomenon of Debré,—as regards which it should be mentioned that it is not, as has been suggested, comparable with the Schultz-Charlton reaction in scarlet fever.

With regard to the production of active immunity, besides the method mentioned of inducing a modified attack, Nicolle has suggested that 10 c.c. of "convalescent" serum should be given to the child whom it is desired to protect and, twenty-four hours later, 1 c.c. of blood from an early case of measles. If the injection of blood be repeated, it is stated that the immunity produced is likely to be permanent. This method is probably reproduced in nature when serum is given in a very early case.

Hiraishi and Okamoto have endeavoured to produce an active immunity by means of inoculation with minute doses—gradually increased—of citrated blood from a patient in the infective stage of the disease. But reports as to the success of this method are conflicting.

The results obtained by the majority of workers who have used the earlier methods referred to, have, however, been decidedly favourable; as is evidenced by the fact that municipal collecting and distributing centres for the serum have been established in connexion with hospitals in Germany, France and America.

Zingher, addressing the New York Academy of Medicine more than a year ago, reported, as the outcome of his study of the subject, that "convalescent measles serum, plasma, or whole blood, has a definite value in the prophylaxis of measles."

And I may perhaps mention that during the period February to July, 1925, my son, while acting as resident at the Children's Hospital in Paris, obtained remarkably successful results in face of a somewhat exceptionally severe epidemic of the disease. Details as to this work (which was rendered possible through facilities most kindly afforded by Professors Nobécourt and Debré) were fully reported by him in the *Journal of Hygiene*, in December last.[1]

In view of the importance of lessening, if possible, the mortality from measles in this country, we shall, doubtless, all agree that it is eminently desirable that a thorough investigation of the whole subject should be officially undertaken as speedily as possible, perhaps somewhat on the lines of that recently initiated in connexion with the work of the Departmental Committee on Scarlet Fever. Meanwhile it is encouraging to learn from Sir George Newman's Annual Report for 1925, that the Ministry of Health, in conjunction with the Medical Research Council, are maintaining close observation upon the important investigations of Dr. Degkwitz (with sheep serum) and the prophylaxis of measles generally. And, further, it is of interest to learn that the Metropolitan Asylums Board have recently decided to allocate much more accommodation for measles, especially during periods of measles prevalence, than has been available hitherto; and also to undertake research in connexion with the disease and its prevention, in the hospitals and the pathological department under their control.

In conclusion, while freely admitting that to prophesy is ever unwise, yet, in the light of what has already been accomplished, it would, I think, be equally rash to deny the possibility that research may presently elaborate a combined prophylactic,

[1] *Journal of Hygiene*, 1925, xxiv, pp. 427-441.

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efficacious perhaps in respect of several of the diseases of an infectious nature, to the incidence of which, especially in infancy, mankind is liable.

Dr. J. D. ROLLESTON said that though it was not the practice to discuss a Presidential Address, he would like, in moving a vote of thanks to Dr. Monckton Copeman for his admirable survey of recent methods of immunization against certain infectious diseases, to refer to some points in the address which specially interested him. Speaking as the President of the Section for the Study of Disease in Children he regarded the recent work of this kind as one of the most remarkable advances made in pædiatrics. The subject was also of interest to him as ex-President of the Section of the History of Medicine, for, as Drs. Debré and Joannon [1] had recently shown, active immunization against measles was introduced by Francis Home, of Edinburgh, in 1758, having been suggested, though never carried into execution, by Alexander Monro in 1757. Home's example appears to have been followed by many others before the method fell into desuetude. In most of the cases inoculated by application to a scarified area on the arm of measles blood taken during the eruptive stage a mild attack of measles appears to have developed after an incubation period of about nine days. Only two instances to his (Dr. Rolleston's) knowledge were on record of bad results following injection of convalescent measles serum. The first, which was reported by Kondratitz,[2] was tuberculous infection of the site of injection and the corresponding lymphatic glands following inoculation of serum from convalescent measles patients who had a positive Pirquet reaction but no clinical evidence of tuberculosis. The second occurred in the private practice of a well-known pædiatrist at Chemnitz, where a boy, aged 3 years, died from fulminating septicæmia seventeen hours after injection of convalescent measles serum. The injection had been carried out with all antiseptic precautions, and the cause of the child's death appears to have been contamination of the serum before injection. Schlossmann,[3] commenting on the case, recommends that in future the preparation, testing and distribution of convalescent serum should be under State control. Owing to the mild course which measles usually ran when it was contracted in hospital with an hygienic environment—in more than twenty-five years' experience of fever hospitals he had never seen a death from measles so arising—he (Dr. Rolleston) did not think it necessary to employ serum prophylaxis in the case of children exposed to measles in a hospital ward where the hygienic conditions were favourable. For the same reason he did not think serum prophylaxis was necessary in well-to-do families, in which measles was usually of a mild character. When his own son contracted measles at the age of 3, he did not think it necessary to attempt to procure convalescent measles serum or to inject the whole blood of his wife or himself to protect his daughter, aged 1 year. The remarkably mild character of the attack which this girl developed in due course would undoubtedly have been attributed to the action of convalescent serum had it been employed in this case. He (Dr. Rolleston) was strongly in favour of active immunization of nurses in fever hospitals against diphtheria. Since the practice had been carried out at the Western Hospital for the last two years, the incidence of the disease among the nurses, though never very high, had been distinctly reduced. He was watching with much interest the attempts to produce immunity by applications of anatoxin to the nose and throat, but suggested that it might be difficult to exclude the action of spontaneous immunization which, as Léréboullet and Joannon [4] had shown, was liable to occur among children in hospital. In view of the mild character of scarlet fever in this country, he (Dr. Rolleston) did not think that immunization against the disease was necessary unless it assumed the virulent form which it did in Dublin at the beginning of the nineteenth century, in Tours in 1824 (when Bretonneau,[5] who for the first twenty-four years of his practice had never seen a single death from the disease, came to regard scarlet fever as no less deadly than plague, typhus and cholera), and in Yunnan-Fu in South-West China in 1922, where the disease proved very fatal on virgin soil, and was at first mistaken for diphtheria by the native practitioners.

1 *Ann. de Méd.*, 1926, xx, p. 343.
2 *Wien. med. Wochenschr.*, 1924, lxxvi, p. 1027.
3 *Deutsch. med. Wochenschr.*, 1926, lii, p. 1241.
4 *Paris Méd.*, 1924, ii, pp. 325, 533.
5 See the speaker's Presidential Address, *Proc. Roy. Soc. Med.*, 1924-5, xviii (Sect. Hist. of Med.), p. 1.

Section of the History of Medicine.

President—Mr. WALTER G. SPENCER, O.B.E., M.S.

The Copper Plates in Raynalde and Geminus.

By LEROY CRUMMER, M.D. (Omaha, U.S.A.).

TWO books important in the history of medicine were printed in London in 1545. One was, in truth, a second edition, but so changed in context and character as to be almost a new book. This was Raynalde's *Byrth of Mankynde*. The other was the first edition of Geminus' *Anatomy*. These two books have shared the honour of being the first books to appear in England illustrated with copper engravings. One, or perhaps two, English books of an earlier date are known with a copper-plate title page, but *The Byrth of Mankynde*, in a less degree, and the *Compendiosa totius Anatomie delineatio æve exarata* to a full extent represent the first attempts, in England, at intentional illustration with copper engravings.

The 1540 edition of *The Byrth of Mankynde* did, however, have copper-plate copies of most of the wood-cut figures of *The Rosegarden* (1513). The plates in this rare edition were very poor examples of engraving on copper, but really antedate the more ambitious efforts of the two books issued five years later.

The changes and modification made by Raynalde in the Jonas text have been so well told by Ballantyne[1] that it is quite unnecessary to go into details, but one novelty in the 1545 edition is of interest. In this text Raynalde has given a description of eleven figures which were to illustrate the book (fig. 1). The pagination of the book is so imperfect that many copies are misbound, but the "Declaratyon by Letters" begins on the recto of Hh VIII, and continues through the six leaves of quire Hhh. This promise of eleven illustrations was not fulfilled, however, and in most of the copies I have been able to study there are only two figures, which, however, agree perfectly with the description given in the "Declaratyon" (fig. 2).

Ballantyne very properly ascribes these plates to Vesalius, but does not note that the direct derivation is from Geminus. This must be so, since the very first copies of Vesalius in copper were those of Geminus. These two figures are bound so as to face each other; in other words, they seem to have been drawn from the same copper-plate on a single sheet and folded so as to fit the octavo. At first glance it would seem that these two cuts were identical with the Geminus figures; but examination shows that the figure on the left is reversed in Geminus' *Anatomia*. The other figure is very similar to the Geminus plate, but Mr. Hind, of the British Museum, has pointed out to me that there are enough differences in the finer details to demonstrate that Raynalde and Geminus must have used different copper-plates.

With this lead it was not difficult to find the origin of the other nine illustrations described, but not issued, in the book. These nine figures are all on one plate in Geminus (fig. 3). On the Geminus engraving the separate figures are numbered from I to IX. The "Declaratyon" carefully describes each figure, even to using a few Greek letters which Geminus copies from Vesalius. Figure I of the Geminus plate becomes Figure III in Raynalde, and so on. That it was known at the time that the "Declaratyon" referred to this Geminus plate is shown by an occasional copy of *The Byrth of Mankynde* with the eleven figures. I have examined two copies of the 1545 edition, and one of the 1552 edition, which have the eleven figures; but in each the two figures are not the original engraving as issued by Raynalde, but are from the plates of Geminus, and, with the nine figures from the other plate, are cut out and mounted on blank paper, the proper index number of the figures written with pen,

[1] J. W. Ballantyne, *Journal of Obstetrics and Gynæcology of the British Empire*, October, 1906, September, 1907, and October, 1908.

booke. Fol. 46

¶ The declaratyon by letters of the fygures folowyng, wherein be set furthe so the dyuerse part in woman mencioned in this booke before.

¶ Of the fyrst fygure.

IN the fyrst fygure, is set furth so much of a mans boodye as may be sufficiente to showe the fourme of the kell callyd Peritoneum: spoken of in the .iiii chapter whose compasse is here noted with. A.B.C.D.

¶ A. A. noteth the grystell, nether ende or poynt of the brest plate, in the pit or pitche of the brest agaynst the stomacke.

¶ E. E. is a lyne descendynge uppon peritoneum from the sayd grystle, doun to the myddel ioynt of the share bone.

¶ F. is the nauell.

¶ G. signyfieth the seed vessels of the left syde in men descendyng out of the amplytude of the bellye.

¶ H. is the ryght seede vessel: but this G. and. H. hath no place in the women.

¶ I. sygnyfieth the ascending vayne and artyre

FIG. 1.

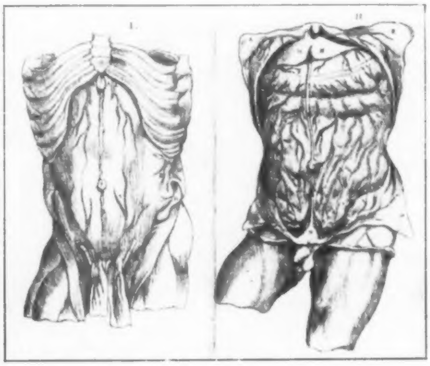

FIG. 2.

FIG. 1.—The "Declaratyon" in *The Byrth of Mankynde.*

FIG. 2.—The two figures of the male abdomen—as seen in the 1545 edition of *The Byrth of Mankynde.*

and the whole bound in a contemporary binding. The Figures I and II in copper also are found in the 1552 edition. In a copy of the 1565 edition in the Library of the Royal College of Physicians there is an unbroken folio sheet containing the nine figures in woodcuts similar to the coppers of the Geminus single-page, but not in the

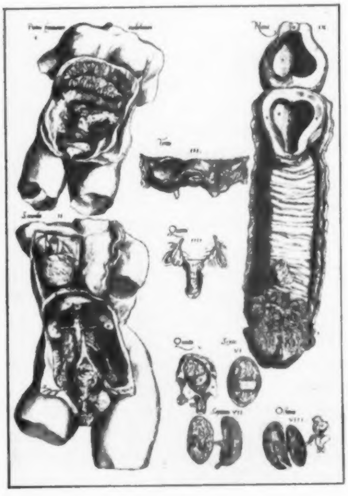

FIG 3.

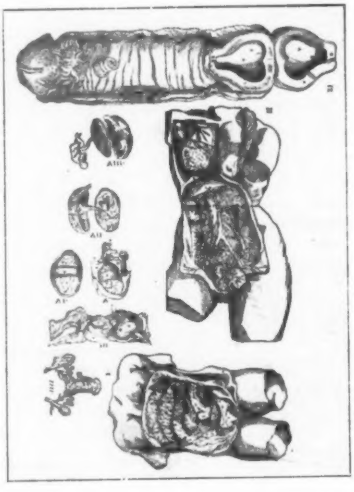

FIG. 4.

FIG. 3.—The nine figures mentioned but not issued with *The Byrth of Mankynde.*

FIG. 4.—The woodcut copies of the copper plates of Geminus in the 1565 edition of *The Byrth of Mankynde.*

same arrangement (fig. 4). The Arabic numerals, indicating the different figures, are all reversed on this sheet, a not uncommon mistake in copies of early plates.

The work of Geminus does not represent a high degree of artistic ability, and perhaps deserves the censure written by Vesalius. It was certainly, however, a far more convenient format than that of the *Fabrica* of Vesalius and established the type which pleased the profession. Geminus thus reached the third edition in England almost ten years before the *Fabrica* was printed for the third time. Furthermore, there were at least two editions printed in Paris from the same coppers in the 1560's. The format established by Geminus was copied by Valverde and Baumann, and even in the Plantin editions as late as 1647.

There are many interesting details in these copper plates of Geminus. One, to which I have found but a single reference, is the peculiar method of repair used in several of the large copper plates. In three of the engravings it can be noted that approximately one-fourth of the copper plate has been sawn out along an irregular line and another piece of copper fitted in and held in place by dumb-bell shaped rivets.

There is another striking peculiarity revealed by close study of the plates (fig. 5). The cut used as Figure I by Raynalde is reversed in Geminus; all the other cuts in Geminus follow exactly the position of the Vesalius woodcuts. In Raynalde the figure is correct. Baumann, who copied Geminus in 1551, engraved the plate correctly, and so did Valverde in 1556. A reverse in copper-engraving usually implies a direct copy: a method slightly quicker and less laborious than tracing or using the mirror method. So this is evidence that at least one figure of the Geminus plates was engraved twice.

The make-up of this particular folio in Geminus shows a difference from his other sheets. The plate-marks indicate that three copper plates were used to print the folio page. Two square plates were used for the left half of the page, each with a single figure; the upper one of which shows the reverse figure. On the right side is the third, a long plate with two figures, the upper one the same figure as used by Raynalde, but not the same plate.

These points are of importance in analysing the work of Geminus. The two cuts are very similar, but measurements give greater variations than can be explained by shrinkage of the paper. There are differences in the shading, and in the size and location of the index letters, which would be impossible in a re-worked plate. The technical treatment of the copper indicates that both plates were engraved by the same hand. So I think the conclusion is justified that Geminus engraved these two figures for Raynalde and used duplicate plates for his own book.

There is no such certainty regarding the other plate. Raynalde picked out and described the nine figures which occur on a single plate in Geminus. The later editions of *The Byrth of Mankynde* have these same illustrations in woodcuts. In some copies of the 1565 edition these nine figures in woodcuts are found on a single folio sheet, though the arrangement is not the same as on the Geminus plate. It was quite impossible to arrange this folio sheet with the nine figures for octavo illustration as was so easily done with the upper half of a folio plate with two figures. Even though no print from such a copper-plate is known, I am yet inclined to believe that Geminus also engraved a duplicate of the nine-figure plate for Raynalde.

The subsequent history of the Geminus plates is known. After the three editions were printed in London the plates were taken to Paris and Gravin printed at least two editions from the same plates, the last as late as 1569.

Were it not for the date, 1540, attached to the inventory of Raynalde's estate, as cited by Colvin, these two plates, one proven, one assumed, would exactly fit with "It. ij ffygures graven on copper, the one the man, the other the woman, with thier entrayles thereto belonging," to which Raynalde refers.

Without assuming to solve the puzzle created by the flat contradictions of the biographical authorities concerning the lives and personalities of these two men, I think we may assume that they were closely associated in a business way and were intimate friends, each ambitious for the fame which comes from art and authorship. I like to picture them discussing the newly published *Fabrica* of Vesalius. Geminus decided to turn his ingenious fingers to the comparatively new art of copper-engraving, and to reproduce the cuts and reduce the text of Vesalius. Meanwhile Raynalde, rather jealous perhaps of his friend's opportunity, at the same time studied the new anatomy to see how it would help him in his forthcoming "Woman's Book." He seized eagerly on the anatomical figures of the generative organs, prevailed upon

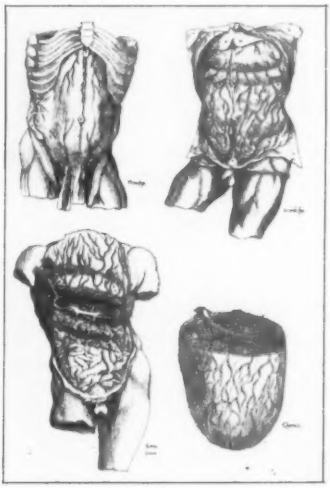

FIG. 5.—The folio plate in Geminus. The upper left figure reversed, the upper right re-engraved.

Geminus to engrave the two duplicate plates, only one of which was used, perhaps on account of the difficulties of printing, perhaps because he ruined the first plate; perhaps because of a quarrel with the cantankerous Geminus. At any rate, by adding the anatomical discussion to *The Rosegarden* he started the line of scientific development of obstetrics at practically the same time that certain Continental printers seized upon the "Birth Figures" of *The Rosegarden* and added them to the popular text bearing the titles *The Secrets of Albertus Magnus* and the *Secret of Secrets of Aristotle*, thus combining alluring title and pseudo-science in such an attractive way that every year since, the sale of these secret books has probably been greater than the sale of the most successful book in the true line of scientific descent from Raynalde.

NOTE.—I am indebted to Dr. Harvey Cushing for the first suggestion that the first plate was reversed; Mr. Arthur E. Hind, of the British Museum, has been most courteous in studying these prints with me, and Sir D'Arcy Power, as always, has been most helpful.

Section of Neurology.

President—Sir JAMES PURVES-STEWART, K.C.M.G., C.B., M.D.

A Clinical Study of Intracranial Tumours and especially of Some Errors in their Diagnosis.

PRESIDENT'S ADDRESS.

By Sir JAMES PURVES-STEWART, K.C.M.G., C.B., M.D., F.R.C.P.

THE subject of "Intracranial Tumours," which I have ventured to select, is of peculiar interest to myself, for it was owing to a happily successful guess as to the localization of a cerebellar tumour thirty-one years ago that I was first encouraged to launch into the great stream of neurology, a channel whose depths, rapids, and hidden rocks have been so assiduously explored, and are still being charted, by workers of greater ability and industry than myself.

Although I am conscious, as all of us are, of the necessity for every alert physician to study carefully the records of other observers, I do not propose to weary you by any quotations gleaned from the literature, or by statistics compiled from the joint observations of other neurologists. On the present occasion I have decided to limit myself to those cases of which I have made personal notes. More than that, I

DISTRIBUTION OF 115 VERIFIED CASES OF BRAIN TUMOUR.

Cerebral cortex	Pre-frontal	10		
	Mid-frontal	5		
	Orbito-frontal	1		
	Post-frontal	8		
	Pre- and post-central (trans-central)	3		
	Parietal	8		
	Mid-parietal	1		
	Parieto-occipital	2		
	Occipital	6		
	Parieto-temporal	1		
	Temporal	3		
	Temporo-frontal	2	Total = 50	
Cerebellum	Vermis	4		
	Lateral lobe	13		
	Extra-cerebellar	12	Total = 29	
Centrum ovale				5
Corpus callosum				3
Thalamus				1
Corpus striatum				2
Lateral ventricle				4
Mid-brain	Pineal	1		
	Corpora quadrigemina	1	Total = 2	
Pituitary	Anterior lobe	5		
	Infundibulum and posterior lobe	3	Total = 8	
Cisterna magna				1
Pons and medulla				3
Basal meninges				3
Multiple tumours				4
				115

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have selected from these cases only such in which the anatomical situation has been actually verified, either by autopsy or by surgical operation.

I find myself in possession of clinical notes of 253 patients who had signs and symptoms pointing to intracranial tumour. Of these, however, only 119 cases have been anatomically verified and I will comment on these alone. This is but a modest total. Its smallness, however, may be compensated to some extent by the fact that the observer has been the same throughout, although I should like to think that even this personal factor has been improving in quality, with increasing experience, as the years rolled on.

The analysis of even this moderate number of cases has proved a lengthy affair and it is impossible for me, in the time at my disposal, to quote the details of some seventy illustrative cases which I have selected. I must content myself, therefore, for the purposes of this address, by showing a series of slides exemplifying tumours in various regions of the brain, leaving their more detailed description for later publication elsewhere, where those who are sufficiently interested may study it at leisure.

Gross Errors in Diagnosis.

Let me now refer to certain gross errors in the diagnosis of cerebral tumours.

This is a category of cases of which every honest observer should keep a record. Many authors dignify such cases by the name of "pseudo-tumor cerebri." But it is more accurate, although humbling to one's self-esteem, to record them frankly as mistakes in diagnosis. Whether some errors are less blameworthy than others, depends, not so much on the amount of human knowledge or acumen of the observer, as on the amount of care which he shows in striving to attain a correct diagnosis. Doubtless some of my audience might have escaped many of the particular pitfalls into which I happened to fall, but I would remind you of the old maxim that not one of us is infallible, not even the youngest. And perhaps it is just as well, for if the day ever arrives to any of us when we cease our upward toil and stop learning, it is time for us to retire from the practice of neurology and leave the field to keener and better rivals. In any case it is not for me to philosophize, but to record the following cases, as examples to be scrupulously avoided. Needless to say, these are not included in the tabular list which I have already shown.

Case No. I.—A young woman, G. Tr., aged 17, had been liable to attacks of headache and vomiting for many years. Three years ago she had an attack of unconsciousness in the street and was carried home unconscious, with rigidity and loss of power in the left arm and leg. This attack was followed by vomiting. The weakness of the left limbs passed off within a few days.

Eight months ago she had a second attack during sleep. She was found comatose, with widely dilated pupils and clonic spasms of the left face, arm, and leg, together with clonic twitching of the eyes towards the left. She did not recover consciousness until eight hours later, when she had complete left-sided hemiplegia of the face, arm, and leg. Together with this, there was complete blindness of both eyes, the pupils being dilated and insensitive to light. Coarse nystagmus was also present. At this stage she was seen by an ophthalmologist, who observed that the optic discs were pale, with marked reduction in size of the retinal vessels.

After four or five weeks of total blindness, she recovered vision to a slight extent, so that she became able to distinguish large moving objects against a bright background with either eye, and even to recognize bright colours. It was observed, however, that her vision was no longer central and that, in order to see objects, she had to hold them to one or other side, in the periphery of the fields. The nystagmus persisted. Although the eyes remained severely disabled, the weakness of the left face, arm, and leg steadily improved. She then became bright and alert once more, able to use the left arm moderately well and to walk, dragging the left leg.

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On examination she was a tall young woman of heavy physique. During the last year she had grown three inches and gained twenty-one pounds in weight. Her height was now 5 ft. 9 in. and her weight 164 lb. Radiograms of the skull showed no abnormality and, in particular, the bony sella was clear, with overhanging posterior clinoid processes. Vision was severely impaired. She was only able to distinguish a bright light in a small area in the left half of both visual fields. The optic discs were atrophic and chalky white. The pupils were dilated and insensitive to light. There was constant slow lateral nystagmus, increased in range on looking towards either side, especially to the right. The cranial nerves were otherwise normal. There was a trace of left facial weakness, so that the left eyelashes were less deeply buried than the right on screwing up the eyes, and the left naso-labial fold was a trifle shallower than the right. To cotton-wool and pin pricks there was no sensory loss. The left grasp was a little feebler and the left lower limb a little less powerful than the right at all joints. There was no unsteadiness with the finger-nose or heel-knee tests. Her gait was that of a blind person, and she did not drag either foot. The supinator-jerk, knee-jerks, and ankle-jerk were all brisker on the left side and there was left-sided ankle clonus. The left plantar reflex was extensor in type: the right was flexor. The left lower abdominal reflex was absent; the other abdominal reflexes were normal. The mammary glands were well developed. There was no abnormal enlargement of the hands, feet, or mandible. The heart was normal; the blood-pressure measured 130/78 and the urine was free from sugar or albumin.

Pneumo-radiograms were carried out by means of bilateral ventricular punctures. The left lateral ventricle was found to be slightly larger than the right, being reached at a depth of 5·5 cm., whereas the right was only reached at a depth of 7 cm. from the surface. The ventriculograms showed no gross dilatation, but the posterior horn of the left ventricle bulged inwards beyond the middle line, thereby suggesting that the right posterior horn was relatively smaller in size.

The cerebro-spinal fluid contained less than 1 lymphocyte per c.mm., gave negative Wassermann, gold, and globulin reactions; its albumin content was 0·01 per cent., and sugar content 0·058 per cent. Glucose tolerance was tested in the blood. The curve did not rise above 0·15 and was slow in returning to normal.

The presence of headache, vomiting, double optic atrophy and almost complete blindness was strongly suggestive of an intracranial tumour. The rapid growth of the bones and the increase of weight, especially during the last twelve months, were further suggestive of insufficiency of the posterior lobe of the pituitary, whilst the slight increase of sugar-tolerance was also compatible with such a diagnosis. The likeliest cause seemed to be a congenital suprapituitary cyst. The two attacks of left-sided hemiplegia, one of which was accompanied by clonic spasms of the left side, seemed compatible either with a sudden hæmorrhage into a cyst or some other transient vascular disturbance implicating the right cerebral hemisphere.

In view of the profound blindness, I did not feel justified in suggesting surgical intervention. Nevertheless I took the opportunity of obtaining the advice of Mr. Percy Sargent, with his wide experience in brain surgery. Mr. Sargent, like myself, suspected a suprapituitary growth and agreed that operation was not called for at the time. The patient accordingly returned home.

A week later the patient developed a temperature of 104° F., which persisted in spite of drugs, sponging, icebags, &c. There was no spasm and no paralysis. After a week it was noticed that the nystagmus had ceased. She rapidly became drowsy, with occasional spasmodic jerkings of the eyes to the left side. Following this, she became comatose and died a fortnight after her return home.

The post-mortem findings of the brain were a surprise. Instead of showing a supra-pituitary tumour, as one had expected, there was a pigmented area of softening in the head of the right caudate nucleus, apparently from old hæmorrhage (illustration shown). In addition, there were numerous small ground-glass patches of disseminated sclerosis, scattered throughout the corona radiata of the right cerebral hemisphere. The left cerebral hemisphere was almost completely free from these patches, of which only two small ones, in the earliest

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stage, could be detected. The cerebellum, pons, and medulla were normal on naked-eye section. The pituitary gland was normal in size, but unfortunately was not removed for microscopic examination.

Looking back on this case, the chain of fallacious reasoning was as described above, whereas the true sequence of events was probably as follows:—The patient's original attacks of left hemiplegia were due to a vascular lesion, the traces of which were ultimately found in the right caudate nucleus. The progressive optic atrophy was not post-neuritic, as was originally suspected, but was a primary affair, whilst the nystagmus was not attributable to the blindness but was one of the signs of a disseminated sclerosis. Had all the abdominal reflexes been absent, we might perhaps have had an inkling of the true state of affairs, but the absence only of the left lower abdominal reflex was regarded as merely an evidence of an ordinary hemiplegic attack. It is difficult even now to account for the adiposity and rapid growth of the long bones, unless perhaps there was a patch of sclerosis in the posterior part of the pituitary body, which unfortunately was not available for microscopic examination.

The next two cases were diagnosed as cerebellar tumour, whereas events proved both of them to have been cases of hydrocephalus, unilateral in the one, and bilateral in the other.

Case II.—A little boy, P. Ro., aged 8, following an attack of measles nine months ago, developed headache and drowsiness which culminated in a left-sided otitis media, requiring puncture of the tympanic membrane. Otorrhœa persisted for a couple of months and then ceased. Six weeks ago an abscess appeared, for which a complete mastoid operation was carried out a month ago. This healed soundly and there had since been no further ear discomfort. Three weeks ago he was noticed to have a squint in the left eye. After apparently shifting from one eye to the other and back again, the squint ultimately settled in the right eye. The temperature had been normal, ever since the mastoid operation. There had been no headache or vomiting.

On examination he was a bright, rosy-cheeked, intelligent little boy. Both optic discs were severely swollen; vision in both eyes was reduced to $\frac{6}{6}$. The pupils were equal and normal. The right external rectus was paralysed; the other cranial nerves were normal and hearing was acute in both ears. There was no motor or sensory paralysis of any limb. The right upper limb was slightly unsteady with the finger-nose test; there was no unsteadiness of either leg with the heel-knee test. The knee-jerks were not elicited; the ankle-jerks were normal and equal. The plantar reflexes were flexor and the abdominal reflexes brisk. There was no cervical rigidity and Kernig's sign was negative.

The cerebro-spinal fluid was under great pressure, issuing in a jet of six or eight inches. 22 c.c. were removed before the pressure fell to normal. The fluid contained 1·3 lymphocytes per c.mm. and had no excess of protein. A leucocyte count in the blood showed 10,000 white cells per c.mm., of which 67 per cent. were polymorphs, 31 per cent. monomorphs (22 small and 9 large), and 2 per cent. basophils.

In view of the negative findings in the cerebro-spinal fluid, an inflammatory lesion was excluded, wrongly as it proved. The unsteadiness of the right upper limb, so far as it went, seemed compatible with a right-sided cerebellar lesion, whilst the intensity of the optic neuritis called urgently for relief. Accordingly Mr. Arthur Evans did a bilateral decompressive craniectomy in the cerebellar region. When the dura was opened no definite mass could be palpated, but both lateral lobes, especially the left, bulged markedly. For the first twelve hours after the operation, the patient seemed very well. He then rapidly collapsed and died during the night.

On post-mortem examination there was a large excess of fluid in all the ventricles of the brain. Both lateral ventricles were dilated, especially the left. No tumour was discovered in the cerebrum, cerebellum, pons, or medulla. Superficial hæmorrhages were present on the posterior aspect of both lateral cerebellar lobes, the result of the operative intervention.

Looking back on this case, it is now evident that it was one of so-called serous meningitis with internal hydrocephalus, following an original attack of measles and a subsequent otitis media. The mistake was in not laying sufficient emphasis on the history and in being misled by the intense optic neuritis and the ataxia of the right upper limb.

Case III.—Another little boy, H.Dy., aged 6, had had measles two years ago, followed by chronic intermittent left-sided otorrhœa. During the last six months he had occasional fronto-vertical headaches. Two weeks ago he had an attack of causeless vomiting and shortly afterwards became intensely drowsy and apathetic. The drowsiness and vomiting continued. Four days ago he had an attack of unconsciousness with left-sided convulsions. Since this attack he had been unable to use the left arm or leg. On the night before admission he was said to have had generalized convulsions and had been mentally confused since then.

On admission he was mentally dull, but he executed simple verbal requests without difficulty. His articulation was so dysarthric as to be unintelligible. The heart, lungs, and abdominal organs were normal and the urine was free from albumin or sugar. The cerebro-spinal fluid was under increased pressure but contained no excess of cells.

The boy lay on his left side with the head strongly retracted and the back arched. The left upper limb was rigidly flexed at the elbow; the shoulder and fingers remaining flaccid. The left lower limb was rigidly flexed at the hip, knee, ankle and toes. When passively placed in a sitting posture, the left limbs retained the same posture as before and he tended to fall towards the left side. When placed on his feet and supported on both sides, he tended to walk backwards or to fall back. When led forwards he took short steps and moved in a wide circle towards the right side. When standing still, he fell backwards at once.

In addition there were frequent attacks of sudden tonic spasm of the left face, arm, and leg, lasting a few seconds at a time.

Both optic discs were swollen, especially the right. The right pupil was larger than the left; both reacted to light. There was occasional transient, internal squint of the left eye. The face, palate, and tongue moved normally.

There was no voluntary movement in the left upper or lower limbs, but their flexed posture was now and then increased in intensity by the tonic spasms above referred to. He made occasional voluntary movements with the right limbs. The knee-jerks and ankle-jerks were normal. The plantar reflexes were flexor in type; the abdominal reflexes were absent.

A week later the head retraction was still more marked. Both knees were now rigidly flexed, especially the left. The mental dullness was more profound. Later, the head became tonically rotated towards the right. The flexed posture of the left limbs was maintained, even during coma, and the left toes became tonically flexed into the sole. The plantar reflexes remained flexor in type throughout. He died a fortnight after admission, the temperature remaining normal to the end.

The foregoing case, although occurring in the year 1908, before neurologists had begun to discuss or adequately to study the nature of decerebrate rigidity or of tonic fits, was suggestive, even in those days, of what Hughlings Jackson had described to us, his pupils, as cerebellar fits. The attacks were totally unlike ordinary cortical fits. The intense optic neuritis made one suspect the possibility of an intracranial tumour. The negative findings in the cerebro-spinal fluid were against an inflammatory lesion, meningeal or otherwise.

The post-mortem examination, to our disappointment, showed no signs of tumour in any part of the brain. Beyond a moderate degree of distension of the ventricles, no abnormality was discovered in the brain or meninges.

How, then, are we to explain this case? The likeliest explanation I can offer is that, just as in the case immediately preceding, it may have been a case of serous meningitis with hydrocephalus following the attack of measles, although the interval of two years since the measles was considerably longer than one usually meets with

in serous meningitis. Perhaps some of my audience will be able to suggest a more satisfactory explanation.

The last of my series of confessions of signal failure of diagnosis was perhaps even less excusable. The patient was only seen once, in consultation.

Case IV.—A man aged 45, F. Gu., who denied venereal disease, complained of inveterate diffuse headache of about four months' duration. This pain steadily increased in severity. Three weeks previously he had became mentally dull, with loss of memory and disorientation as to time and place. The mental dullness rapidly deepened, and, on the day before I saw him, he developed causeless vomiting. There had been no convulsions and no attacks of unconsciousness. There was no history of head injury or of otorrhœa. The heart and urine were normal.

On examination he was mentally confused but his articulation was normal and there were no facial or lingual tremors. He often called objects by the wrong name, e.g., he called a bed-pan a pen-holder. There was no apraxia with either hand, as tested by a chain, scissors, or pencil, all of which were named correctly with the eyes shut and were suitably put into use. He tended to close the right eye from time to time, as if from diplopia, but his mental condition was too dull to permit of confirmation of this possibility. The optic discs were normal and the visual fields were normal on rough test. The pupils were equal and reacted to light. There was no squint or nystagmus and the remaining cranial nerves were normal. No motor or sensory abnormality could be detected in the arms or legs. There was no ataxia. His gait was feeble and he tended to fall backwards when standing. The knee-jerks and ankle-jerks were just present, much diminished. The left plantar reflex was flexor in type: the right was not elicited. There was incontinence of urine. The cerebro-spinal fluid showed no excess of pressure and contained only 3·1 lymphocytes per c.mm. The Wassermann reaction was not determined (this was in the year 1909).

The patient died suddenly four days after I saw him. At the autopsy no tumour was discovered in the brain, but there were two large oyster-shaped subdural hæmorrhages, attached to the inner surface of the dura covering both frontal lobes, and the case was evidently one of pachymeningitis hæmorrhagica.

In this case the progressive headache, followed by cerebral vomiting and mental dullness, taken in conjunction with the absence of pleocytosis in the cerebro-spinal fluid, led to an entirely erroneous diagnosis of intracranial tumour. It is probable, of course, that nowadays most of us would probably avoid this error. Moreover, it is likely that, had the Wassermann reaction been available for examination of the cerebro-spinal fluid and blood, had his mental symptoms been more carefully observed, and his age, 45, been borne in mind, the presence of headache would not have led us astray, when we remember how frequently pachymeningitis hæmorrhagica occurs in general paralytics. But whatever may be the real explanation of this case, the fact remains that a gross error of diagnosis was committed.

Some Pitfalls in Diagnosis.

Reviewing my own errors of diagnosis in the foregoing series of cases, let me now sum up some of the commoner causes of mistakes.

(1) The size of a brain tumour is usually more extensive than its focal signs would lead one to expect.

(2) In tumours the focal diagnosis of which is mainly dependent on the recognition of sensory abnormalities (whether of the somatic sensations or of special senses), a reasonable degree of intelligent co-operation on the part of the patient is necessary for accurate diagnosis. If the patient be mentally dull (a condition which may sometimes be due to the tumour itself), the extent and even the existence of sensory abnormalities may be overlooked, and the focal diagnosis thereby rendered difficult or impossible. Difficulties of this sort are specially liable to occur in tumours of the parietal, occipital, and temporal lobes.

(3) Pre-frontal tumours occasionally present pseudo-cerebellar symptoms.

(4) Temporal lobe tumours may produce pituitary symptoms from direct extension of the tumour to the pituitary gland.

(5) Tumours of the ponto-cerebellar angle are amongst the easiest of recognition, whereas those in the substance of the cerebellum, especially if growing slowly, are sometimes less easy to locate.

(6) In tumours of the centrum ovale, paralytic signs are sometimes preceded by convulsive phenomena.

(7) In tumours of the pineal body or corpora quadrigemina, the focal signs of quadrigeminal disease may be absent, despite severe compression of these structures by the tumour.

(8) A tumour of the lateral ventricles in one instance produced, in the supine position of the patient, postural headache and vomiting, together with transient weakness of the lower limbs. It is suggested that this syndrome is associated with temporary blocking of the foramina of Munro by prolapse of a soft movable tumour.

Most ventricular tumours produce symptoms only of intraventricular distension, unless they extend into adjacent parts, when other symptoms may be superadded.

(9) Tumours of the anterior lobe of the pituitary body may attain a very large size whilst causing only slight clinical signs.

In supra-sellar tumours, drowsiness is commonly an outstanding symptom. Its occasional sudden temporary disappearance is suggestive of temporary relief or alteration of pressure by a cystic growth.

(10) A tumour may completely fill the cisterna magna without causing focal symptoms in the adjacent cerebellum or fourth ventricle.

(11) In tumours of the basal meninges, the focal symptoms, although easy of recognition, are often much less extensive than might be expected when compared with the subsequent size of the tumour.

(12) In multiple tumours, the main mass of symptoms is sometimes produced by one tumour alone. This is not necessarily the largest tumour, but the one which impinges on recognizable focal areas. Multiple tumours have been mistaken for encephalitis lethargica.

(13) Gross errors of diagnosis in the foregoing series of cases include a diagnosis of intracranial tumour where the patient was suffering from disseminated sclerosis; a diagnosis of cerebellar tumour where the patient had internal hydrocephalus; and a failure to recognize a case of pachymeningitis hæmorrhagica owing to insufficient clinical observation.

Errors, Avoidable and Unavoidable.

A considerable proportion of what I have said is a gloomy record of failures. The old maxim remains true, however, that negative facts sometimes have a positive value, and possibly such a list may serve as a warning to others and thus help to prevent them from making similar mistakes.

Some mistakes should be avoidable. First, there are errors due to carelessness, or to inexactitude, or insufficiency of observation. In this respect there is a wide dissimilarity between various observers. We all differ, not only in our personalities, but also in the relative accuracy of our observations. Another avoidable cause of failure to reach an accurate diagnosis is the human tendency to cling too stubbornly to our first rough conception of a case. Once we have started on an initial false scent, there is an inclination to continue along the same line, bolstering up our primary diagnosis and trying to fit the various clinical features into our old original picture. This is where a consultation with an experienced colleague is so valuable. But the careful physician should also try to reconsider and revise the case himself from time to time. This difficult task consists in wiping out all his preconceived ideas and starting *de novo*, with a careful and systematic re-investigation

8 Purves-Stewart: *A Clinical Study of Intracranial Tumours*

of all the signs and symptoms together with a patient inquiry into the history and chronology of these symptoms, just as if he had never seen the patient before.

A second class of errors in diagnosis is unavoidable. Such, for example, are errors due to the insufficient length of time during which the patient has been ill. In the earliest stages of many a brain tumour, focal signs may be absent, or so inconspicuous as to escape the most expert observer, or they may be too scanty and undeveloped to justify an accurate diagnosis. It may even happen that a brain tumour runs its full course to a fatal termination without displaying any clinical signs, recognizable in our present state of knowledge, which could yield even a hazy suspicion as to its existence, much less as to its location. In other cases, again, physical signs are already present, but our eyes are not yet educated to recognize them. Thus, in the days before we learned to make systematic observations of the visual fields, how many pituitary, temporal, and occipital tumours escaped recognition, which nowadays are located without difficulty? Or again, consider how an examination of the cerebro-spinal fluid, or the outlining of the cerebral ventricles by pneumo-radiography, may throw a flood of light on an otherwise obscure case.

Another source of difficulty in brain tumours consists in the fact that diffusely infiltrating tumours may sometimes attain a large size, and yet, so long as the nerve elements are not destroyed, the clinical symptoms may be relatively scanty, until at last some sudden vascular accident, such as a hæmorrhage, occurs in the growth, thereby causing an immediate increase in the symptoms. Therefore, in the presence of the general signs of intracranial tumour, any sudden onset or aggravation of focal symptoms, as contrasted with a gradually progressive march, should always arouse in our minds the suspicion of a hæmorrhage into a growth.

Many an uncertain or incorrect diagnosis, although humiliating to our vanity, proves later to have its educative value. I would go farther and say that an uncertain diagnosis is sometimes a sign of wisdom. It takes a wiser and more courageous physician to say, "I don't know," when a more rash or less experienced colleague may feel no doubt as to the accuracy of his diagnosis.

As medical science makes further advances, the diagnosis of the exact sites of diseased processes will probably become relatively less important than it is now. On the other hand, the study of the causes of disease will become more profound. Fresh knowledge will surely lead to improved methods of treatment. Whilst I yield to no one in my admiration and respect for the marvellous dexterity of our distinguished surgical colleagues, I cannot help feeling (and I am sure they realize it too) that many cerebral operations are hazardous, crude, and mutilating. Under present-day conditions this is inevitable, even with the most skilful operators. Let us hope that the time will come when many surgical operations on the brain, as on other organs, will be discarded in favour of other more efficient and gentler methods, perhaps biochemical or physical, whereby we shall be able to melt away growths, no matter how deeply seated or how insidiously infiltrating, or, better still, when we may succeed in raising the resistance of the body so as to prevent their appearance altogether.

When that happy Utopia is reached, many of our drugs and surgical instruments will be relegated to their proper places, in museums of antiquities. A small proportion of weapons, however, will always be required for the correction of traumatic injuries, infections, and congenital malformations, and for the treatment of maladies due to carelessness or wilful indulgence, for there are some phases of human nature which even science, alas! is powerless to change.

Section of Ophthalmology.

President—Sir ARNOLD LAWSON, K.B.E., F.R.C.S.

Cases of Peripheral Choroiditis.

By J. COLE MARSHALL, M.D., F.R.C.S.

Case I.—B. J., male, aged 23.

Occupation.—Collar worker.

History.—Attended at Moorfields, 2 years of age. Apparently had interstitial keratitis (some fine empty vessels are seen on the right upper part of cornea). At 12 years of age was told he should not do clerical work.

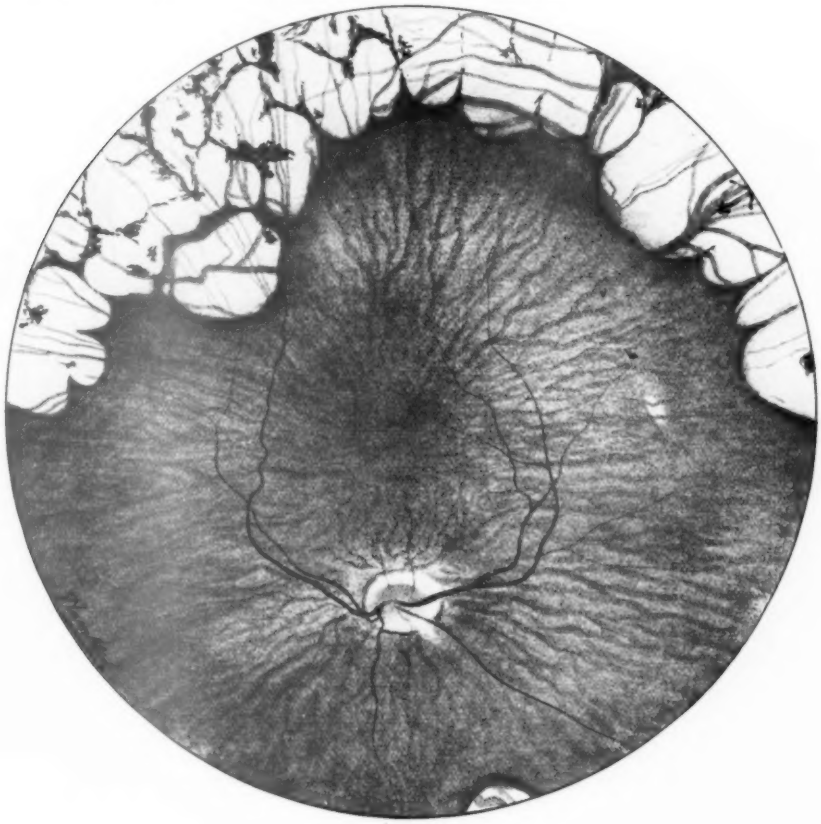

FIG. 1.—Case I.

1924.—Complained of poor vision and eyes burning. Vision: right, $-4{\cdot}5 \supset$ cyl. $-2{\cdot}0/60 = \frac{6}{60}$. Left: $-4{\cdot}0 \supset$ cyl. $-1{\cdot}5/120 = \frac{6}{36}$.

1926.—Vision with glasses $\frac{6}{60}/\frac{6}{18}$. Wassermann negative. Fields centrally contracted to 20° circle.

2 Cole Marshall: *Cases of Peripheral Choroiditis*

Points of Special Interest.—Lenses: large corpuscular-looking opacities, increasing in size. Opacities in the vitreous. Both discs pale; a small hæmorrhage seen on the left disc in 1925. Large areas of choroidal atrophy, with some pigment between them, a little more noticeable than in the case of A. E. L. (fig. 1).

Case II.—E. W. J., cousin of A. E. L., brother of B. J., aged 19, male.

Occupation.—Clerk.

Duration of Disease.—Not ascertainable.

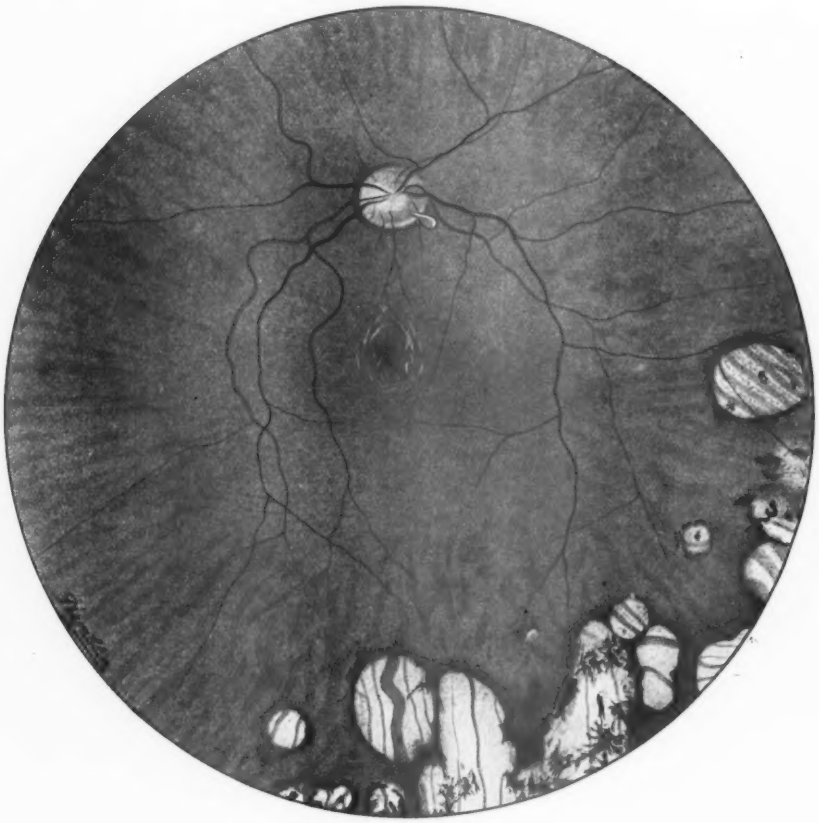

FIG. 2.—Case II.

History.—Worn glasses since 13 years of age. Vision: right, with − 4·5 ⌒ cyl. − 1·0/30 = $\frac{6}{24}$. Left − 5·0 ⌒ cyl. − 0·75/160 = $\frac{6}{12}$. Fields: contracted to 40° circularly.

Points of Special Interest.—Fine circular opacities in both lenses. No vitreous opacities seen. Patches of choroidal atrophy seen at the periphery. More pigment present than in the other cases—also some small patches of choroiditis present (fig. 2).

Case III.—A. E. L., male, aged 27.

Occupation—Grocer.

Duration of Disease.—Impossible to ascertain.

History.—Patient seen first in 1919, complaining of bad sight. No headaches or other eye symptoms.

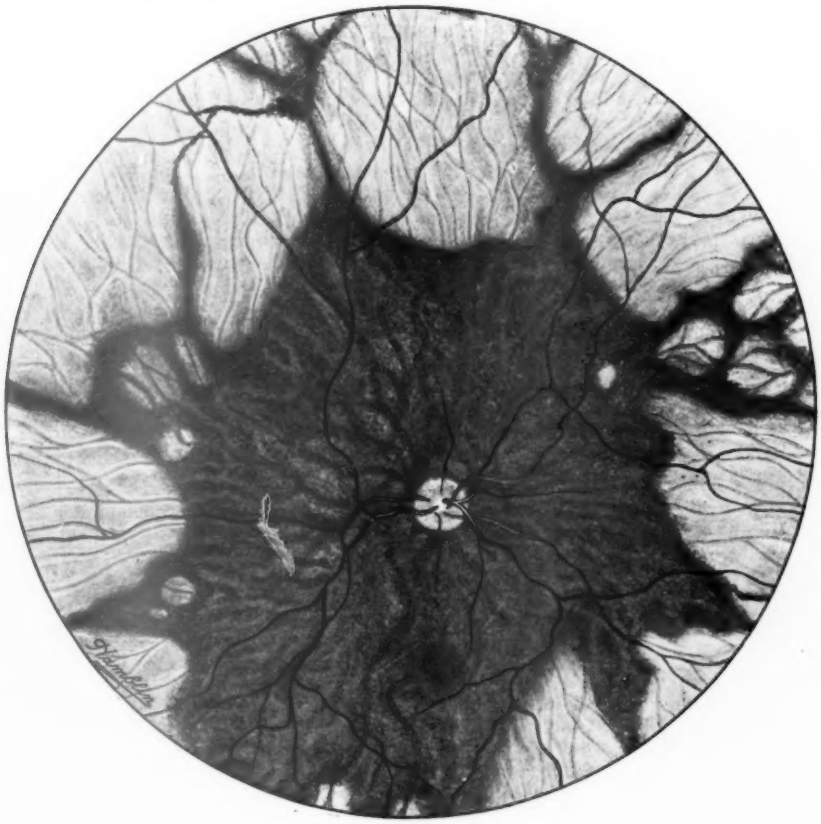

FIG. 3.—Case III.

November, 1919.—Glasses ordered: Right − 3·0 sph. ⊃ − 1·5 cyl. 60 = $\frac{6}{9}$. Left − 3·50 ⊃ cyl. − 1·0/120 = $\frac{6}{9}$. Vision varies very much according to general health.

March, 1926.—With practically same correction, right eye = $\frac{6}{18}$, left eye $\frac{6}{12}$. Wassermann reaction negative.

Points of Special Interest.—Fine opacities in both lenses; the opacities are increasing, in the *left* eye there is a "propeller"-shaped opacity. No vitreous opacities have been seen. In *the periphery of the fundus* are large areas of choroidal atrophy; there is very little pigment present.

4 Cardell: *? Choroidal Sclerosis;* Rea: *Angioma of Retina*

I think these are cases of atrophic choroiditis, probably of a familial type, because two of the cases I am showing this evening are brothers, and the other is a first cousin. I have not been able to trace any other cases in the family. The mother has bad sight, but that is due to early cataract. In the third case, which is that of the cousin of the two brothers, there is a large area of atrophy of the choroid, peripherally placed, but no pigment, and no atrophy of the nerve (fig. 3). The elder of the brothers is aged 24, and his vision is rapidly going down, due principally to the nerve showing waxy atrophy. There is more pigment between the areas of atrophy, and there are marked corpuscular cells in the lens and vitreous opacities. Two years ago he showed an active sign—a small hæmorrhage on the front of one disc, but it soon cleared. Wassermann reaction negative.

The youngest of the patients (Case II) is aged 19, he is myopic, and his vision is rather poor, but he sees better than the other two patients. I do not think the nerve is affected. As already stated there are opacities in the lens, and in this case there is more pigment between the areas of atrophy. I cannot get an early history of these cases, except, as I have said, that one boy (Case I) had interstitial keratitis when he was aged 2, and attended Moorfields two years. That is substantiated by fine empty vessels in the cornea. A young brother is apparently suffering from encephalitis lethargica, and the doctor to whom I wrote said he had some signs of a congenital specific trouble. As these cases seem to be of interest, I will try to find out more about the patients.

Discussion.—Sir ARNOLD LAWSON (President) asked whether these patients suffered from night-blindness. The arteries, according to the pictures, looked very small, and the condition might have a vascular origin.

Mr. COLE MARSHALL (in reply) said that, on being further questioned, the patient suffering from optic atrophy had complained of poor vision at dusk.

Postscript.—Since showing these cases I have seen three more members of the family and have found their eyes perfect in every respect.

? Choroidal Sclerosis.

By J. D. M. CARDELL, F.R.C.S.

PATIENT, a male, aged 60; occupation, painter.

History.—Vision began to fail three years ago; this failure is gradually increasing.

This patient was seen by Mr. Goulden and myself for the first time this morning. He is a man aged 50, a painter, who came complaining that his sight first gave him trouble three years ago: since then his vision has progressively become worse, so that now he can only count fingers at 1 metre with the right eye, and at $\frac{3}{4}$ of a metre with the left. One can see a white plaque about the disc in each eye, and at the periphery; at the macula in each eye there is a hæmorrhage. The choroidal vessels are atrophied. We discussed whether the plaque was of exudative or hæmorrhagic origin, and Mr. Goulden decided in favour of the origin being exudative.

Angioma of Retina of both Eyes.

By R. LINDSAY REA, F.R.C.S.

PATIENT, a female, aged 26. There was central choroiditis in the right eye, and when this had cleared up I saw some large vessels running upwards and outwards, superior temporal vessels running from the disc. I have seen this before in two cases of angioma of the retina. Pathological sections of two cases have been described by Mr. Treacher Collins. When I traced the large vessels upwards and outwards to the

periphery, I found an enlarged white area looking like a detachment, but it was not that ; it was more solid and was creamy in appearance. I found the same condition in the other eye. She has choroiditis in the right eye only ; the left has remained the same throughout life.

With regard to prognosis in these cases, one case previously described ended in a glaucomatous condition.

Mr. RAYNER BATTEN showed a series of Fundus Drawings illustrating the various forms of pathological changes associated with myopia.

Section of Ophthalmology.

President—Mr. ERNEST CLARKE, C.V.O., F.R.C.S.

Progress in Ophthalmology.

PRESIDENT'S ADDRESS.

By ERNEST CLARKE, C.V.O., F.R.C.S.

THE Presidential addresses of my predecessors have been of two kinds: some have been retrospective and others have presented and elaborated a subject in which the authors have been specially interested. I propose to combine these two methods, in other words, to review the progress that has taken place in ophthalmology during the last half century and to limit myself to those subjects in which I have been particularly interested.

I feel that I am particularly qualified to be retrospective, as my "ophthalmic life" began exactly forty-five years ago, when I was appointed clinical assistant to Mr. Waren Tay at Moorfields with Mr. Adams Frost as my colleague.

Tay, who is still living, was a specially good teacher for a beginner; he was most painstaking in explaining and very keen on minutely examining all fundus cases, especially if they seemed out of the common. It was Tay who first described central senile guttate choroiditis, a disease now known to be degenerative, and bearing his name. He also was the first to describe the fundus changes in "amaurotic family idiocy." He was a most generous master, for he gave us many operations to perform under his supervision, even cataract extractions.

In the summer of the year 1881 I attended Donders' Clinic at Utrecht and there met not only Donders himself, but also Professor Snellen. It was Snellen who explained to me his idea of detecting malingering by using red and green glasses before red and green letters. On my return to Moorfields I gave an account of the scheme to Tay and Adams Frost and between us we arrived at the word "Friend," the only word in English of six letters that gives two separate words with alternate letters. This was the origin of the "Friend" test.

About this time Lister's teaching was making itself felt, but it had barely passed what one may call the "fetish stage." In Paris, Berlin, Utrecht, and London, I saw the most curious examples of the misconception of antiseptic and aseptic principles. I saw a world-renowned oculist carefully and for ten minutes scrub his hands with a sterilized nail brush, and then adjust the patient's bare head with his naked hands. I have seen an equally famous ophthalmic surgeon hold the Graefe knife he was going to use for cataract extraction in his mouth while he adjusted the speculum. I mention these facts to point out how much we have progressed since then, and although in eye surgery it is impossible to secure complete asepsis of the conjunctival sac, our present methods of cleaning the eye and the skin round the eye, and sterilizing our instruments account for the very small incidence of sepsis that occurs after eye operations.

You who are daily using cocaine, novocaine, and the like, can hardly realize that

these useful local anæsthetics were unknown at this time, for it was only in 1884 that Koller, of Vienna, introduced cocaine to the medical profession. The special value of local anæsthetics to the eye surgeon, as well as to the patient, is so apparent that it is unnecessary for me to dilate upon it, but I cannot help warning you that it may be misused.

We do not always appreciate the value of pain. Years ago Hilton, in his classical book "Rest and Pain" showed that pain was nature's most beneficent ally; that without pain living beings would have become extinct long ago. And yet how often attempts are made to allay pain with a local anæsthetic without finding the cause of the pain. A foreign body stuck in the cornea causes great pain which is at once relieved by a drop of cocaine, but we must also remove the foreign body. Pain is nature's warning that something is wrong; an injection of novocaine into the gums will at once stop the pain of violent toothache, but it will not remove the abscess at the apex of the tooth which may be the cause.

Perhaps the greatest change I have seen over this long period consists in the treatment of errors of refraction and muscle balance. When I first went to Moorfields the cases of lenses were very small. The numeration had lately been changed from inches to dioptres, there were divisions of ··25D up to 1D, then, ·5D up to 6D. The trial frames were non-adjustable, which thus reflected the very primitive state of the refractionist's armamentarium. Testing the refraction by retinoscopy or the "shadow test" had lately come in and was a most distinct improvement over the old subjective method.

Eyestrain had been recognized and was styled "asthenopia," and practically the only symptom allocated to it was headache. In 1892 I published a book on "Eyestrain," which was very well received and reviewed. I was inspired to write it by the work of Gould, of Philadelphia, and I shall ever be most grateful for undertaking this work as it entailed reading every published book on refraction, and Donders' classical treatise became my daily companion.

Incidentally, I may mention that in 1914, to celebrate the jubilee of the appearance of Donders' work in 1864, I published a book on his work and the lessons learnt from it, and as Donders first published his book in English, I, as a small return compliment, published mine in Dutch. Unfortunately the appearance of the book coincided with the advent of the Great War, and the strained relations between us and Holland prevented any official acknowledgment of my effort, although I had a delightful personal letter from Professor Straub, of Amsterdam, congratulating me and saying that he wished he had been the author.

Gradually eyestrain has been taking a more prominent place in ophthalmology and general medicine. We now know that there is probably no functional nerve trouble that may not be caused or partly caused by eyestrain; that it enters as a second or third partner in innumerable complaints and that by preventing it we may indefinitely postpone epileptoid attacks, migraine, recurrent iritis, and possibly delay or postpone the appearance of glaucoma and cataract. We know that eyestrain is more likely to be present with small errors and that in sensitive patients $\frac{1}{8}$ D may make all the difference between happiness and content, or discomfort and unfitness. In certain individuals eyestrain may be one of the frictions of life, and a waste of nerve energy; just as friction is a waste in mechanics.

We are told that longevity is hereditary, which means that an individual born of long-lived parents inherits something—a "send off"—of nervous energy, "vril," call it what you like, that enables him, excepting accidents, to outlive his fellows. It is possible that this property may have some connexion with, or be dependent on, one or more of the endocrine glands, but of one thing we are certain, it can be wasted. This

wasting is very often quite small but it is going on during all the waking hours when eyestrain is present and may be imperceptible—that is, no definite symptoms such as headache may indicate its presence, hence it is most insidious. This waste lowers the resisting power to disease both locally and generally, so that the individual exposed to some infection which he ought to be able to withstand, succumbs because his fighting power has been lessened. As in these days preventive medicine holds a very high place, the possibility of the presence of eyestrain should always be borne in mind.

There are some who are preaching that cycloplegics are not necessary in estimating the refraction of the eye, but speaking to you with the experience of a life's work I would warn you not to listen to them. Most people under forty years of age and some under fifty do not, and cannot relax their accommodation completely, so that you cannot get down to the "bed rock" of the real condition of the eye. Donders preached the value of paralysing the accommodation and the lapse of seventy years has only served to strengthen his teaching. It is true that in many cases the atropine or homatropine examination reveals nothing new and the cycloplegic need not have been used, but in my experience these cases certainly do not amount to 25 per cent., and for the sake of the remaining 75 per cent. we must paralyse the accommodation in all young patients. It is, however, important to remember that unfortunately we have a dilated pupil during our examination, and therefore a post-cycloplegic examination is very often necessary before prescribing glasses.

In the discussion on a paper before the Ophthalmological Convention last year by Mr. Burdon Cooper a good deal was said about the abuse of cycloplegics, but Dr. Hawley of Chicago struck the right note when he said the object of the cycloplegic was not so much to find out the amount of hypermetropia or myopia, but the exact amount of the astigmatism, and there is no doubt that very small errors of astigmatism, that mean so much, cannot be fully revealed without a cycloplegic in patients up to the age of 40 or 45. The ophthalmometer may reveal the presence of the defect but in checking this with the subjective test, which should always be done, you can get no definite answer until the ciliary muscle is paralysed.

Some of you may think that I have made too much of the importance of eyestrain; but remember I have had exceptional advantages (more perhaps than any of you here) in working on this subject, which has really been the "backbone" of my life's work, and if you had had my experience and observed the numberless cases where correct refraction has altered the patient's life for the better, where even it has saved life, you would not be surprised at my attitude. There is however one warning note I should like to sound. There is always the danger in specializing, of becoming biased and prejudiced, "of not seeing the wood because of the trees," in overlooking an important item that your ardour has blinded you from seeing; consequently always be on the look out for this and check your work.

In the treatment of myopia we certainly have advanced. In my young days it was customary to let myopes of say, 3 or 4D do all their near work without glasses, and if the myopia was higher, for instance, 7 or 8D, 2 or 3D was taken off for near work. Time has shown that the ideal treatment of myopia is to correct it fully with any astigmatism that is present, and force the ciliary muscle to do its proper work, and in this manner stay the progress. In the paper I read before the Congress last year I think I showed conclusively that Sir Arthur Keith was right—that myopia was due to a badly constructed sclerotic and that this was prenatal and inherited. I suggested that this faulty sclerotic might owe its origin to some defective influence of one or more of the endocrine glands. I also pointed out that we might stay the tendency to lengthening of the eyeball or retard it by careful refraction and by preventing undue convergence in the very early years of life.

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Presbyopia used to be very inadequately treated—a plus glass, generally the same in both eyes, and no correction of astigmatism unless large in amount. Now we know that the presbyopic age is just the age when, if eyestrain is present, it does the most harm. The vital energy is less, recuperative powers are less, very often worries and troubles of life are more acutely felt. We must correct the distant vision if an error exists as well as the reading, and the best way of doing this is by making the patient wear bifocal glasses. The improvement in the optician's art has made the way much easier, for the invisible bifocals are a very great improvement on the old-fashioned so-called "Franklin glasses." The reason that many people dislike these bifocals is, I think, due to the lower or reading portion being often made too strong. I find from experience that at no time of life is an addition of more than 2·75D needed, and very often up to the age of 65 2D is sufficient to add to the top or distance correction. We must remember that these bifocals are for constant use and, if the reading section is too strong, objects slightly further removed from the eye, such as food on the plate at meals, become blurred. Everything also depends on the correct centering of these glasses and also making sure that the division between the glass should not be higher than the margin of the lower lid.

For many years I have been recording the accommodation power of my patients, and these records now number over 6,000. You may remember that I have found that the average accommodation power, age for age, is somewhat higher than Donders put it, that it is a very delicate index of the "physiological age" of the individual, that if a person looks older and is really older than his or her years, the accommodation power is lower than normal and vice versa; that toxæmia lowers it and that the removal of the toxic condition is followed by increased power.

We have seen great changes in the treatment of imbalance of the extra-ocular muscles—Stevens, of New York, gave us the nomenclature, but it was our own countryman, Maddox, who really put our knowledge on a sound and simple basis, and by his "glass-rod" test gave us a most expeditious and easy method of diagnosing heterophoria—so easy that there is no excuse for failing to register the muscle-balance in every case of refraction. We have seen the fatuous treatment of repeated tenotomies in America which we did not imitate and which fortunately we do not hear of now. We have found that a small amount of exophoria or hyperphoria or both may cause as much eyestrain with all its attendant discomforts and waste as small amounts of astigmatism, that the two conditions are very often associated and that by correcting the refraction carefully we can generally remove the heterophoria. Except in the case of old people, or when the amount of error is large, prisms are not the best treatment. A small amount of esophoria is very common and rarely causes any trouble.

What a large number of important additions have taken place in methods of diagnosis and treatment! Professor Röntgen opened up a most valuable line of diagnosis and treatment when he introduced us to X-rays. They enable us to see changes in the bones of the skull, especially useful in diagnosing changes in the sella turcica associated with changes in the pituitary gland; we are able to locate with precision and accuracy foreign bodies in the orbit and the eye, and in this connexion the work of Mackenzie Davidson will always be remembered.

Radium emanations have been found to be valuable in curing rodent ulcer and epithelioma, also trachoma and vernal catarrh.

Ultra-violet light is helping both locally and generally to cure or ameliorate many abnormal conditions and our knowledge here is increasing. In a recent paper Mr. Goulden has shown that tuberculosis of the iris and ciliary body yields to this treatment, and Mr. Duke Elder has supported this and referred to its use in treating chronic blepharitis.

Vaccine-therapy has proved itself a most valuable remedy, more especially as so many eye troubles originate in sepsis. We are much indebted to Sir Almroth Wright and other research workers for showing us how to fight disease, as it were, with its own weapons. This method we owe originally to the work of Pasteur.

This leads one to realize the great development that has taken place in late years in bacteriology. We are forced to the conclusion that in the treatment of many eye diseases, a careful examination of the blood must be our first aim. Mr. Hepburn and Mr. Browning in their paper at the Oxford Congress, this year, on "Sympathetic Ophthalmitis," pointed to the importance of a differential blood-count.

Mr. Fisher in his paper on "Lymph Channels of the Eye," read at the Convention last year, showed that hexamine introduced with acid phosphate of soda into the system was apparently converted into formic aldehyde and found its way as such into the interior of the eye; and that it acted as an efficient antiseptic in toxic cyclitis. He evolved this idea by a very clever piece of deductive reasoning. As hexamine has now been supplanted by hexyl resorcinol, which does not require an acid medium, it might with benefit be substituted for hexamine.

In treatment also, great changes have taken place, even during the last few years, as the result of our increased knowledge.

It is not so very long ago that hæmorrhages in the retina were all termed "*hæmorrhagic retinitis.*" As high blood-pressure was generally associated with their presence it was supposed to be the cause, and bleeding was, in many cases, adopted as part of the treatment. Fortunately for the patient the effect of bleeding was very transitory. We owe much of our new knowledge on the subject to Mr. Foster Moore. Dr. Dale, and Professor Krogh, of Copenhagen, have also supplied important material. We now know that high blood-pressure in the brachial artery does not necessarily mean high blood-pressure in the retinal artery; at all events high blood-pressure is as much a symptom as the hæmorrhage and they both indicate a toxic condition of the blood.

Dale, in a recent paper, pointed out that Krogh has shown (and other physiologists have acknowledged the correctness of his investigation) that the capillaries have a contractile force of their own under nerve and hormonal control, and that with increased relaxation they become increasingly permeable to the constituents of the blood-plasma until, when fully relaxed, they fail altogether to retain it, and the blood passes without hindrance into the surrounding tissue. If hæmorrhage (from its derivation) means a bursting of blood it is not the proper term to use for this condition; one dislikes hybrid words but *hæmoflux* would be a more appropriate term. Such a hæmoflux would be a very different thing from a large subhyaloid hæmorrhage, or, what Mr. Fisher has rightly suggested should be called a semilunar retinal hæmorrhage, from a ruptured blood-vessel. It has been said that a proper classification of retinal hæmorrhages is badly wanted. Foster Moore has recently suggested the following, which seems to me very adequate. He says the leakage of blood occurs:—

(1) From arterioles, through lodgment of infected emboli; (2) from capillaries due to toxins or to the impairment of the nutrition of the endothelium, as in anæmias; (3) from the venules owing to mechanical causes.

If the toxins are removed the blood-vessels will be restored to the processes of filtration, diffusion, and osmosis. The blood-patches will be gradually absorbed, and if the external limiting membrane has not been penetrated the retina will gradually resume its normal appearance.

I recently had a case of a lady, aged 49, whose right fundus was covered all over by superficial blood-patches. She was found by Dr. McCrea and Dr. Carnegie Dixon to be toxic from streptococcal and *Bacillus coli* infection. She received a series of doses of autogenous

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vaccines and in a few months completely recovered with normal vision and not the semblance of a scar is now visible in the retina.

We must remember that the leakage of blood in the retina due to toxæmia may be non-bacterial in origin, as Mr. Fisher pointed out in a very valuable paper on "Retinitis in Pregnancy," read before this Section some ten years ago.[1]

One of my predecessors in this chair, Mr. William Lang,[2] was the first to draw attention to *dental sepsis* as a prolific cause of eye trouble, and since then we have found that not only the teeth, but the tonsils, the various accessory sinuses and, in fact, every part of the alimentary tract may be the origin of poisons circulating in the blood, causing ulcers and inflammation of the cornea, iritis, cyclitis, choroiditis, retinitis and possibly starting glaucoma and cataract. A Discussion early this year between this Section and the Section of Laryngology, opened by Mr. Affleck Greeves,[3] showed how often a toxic condition (in Mr. Greeves's case the influenza bacillus) of one of the accessory sinuses leads to retrobulbar neuritis and papillœdema.

The more exact and careful study of embryology has served to explain not only most of the congenital malformations, but also pathological changes. We owe much to Miss Ida Mann for her valuable and interesting work on this subject, and we hope she will, in the future, give us more.

It has been suggested that as our knowledge increases our nomenclature might be altered in certain cases. It has been suggested that *K.P.* should now be called "keratic precipitates" and that retinitis pigmentosa should be styled "pigmentary degeneration of the retina," but I do not think the matter is important. One word, fortunately, we have, I think, definitely expunged from our vocabulary, viz., *idiopathic*, always the refuge of the ignorant. "Idiopathic iritis" and "Idiopathic detachment of the retina" are terms the use of which lingered a long time, but our greater knowledge of toxic states has gradually displaced them.

You will note that it is on the medical side that these great advances have taken place; marked changes for the better in surgery are not conspicuous.

In the treatment of glaucoma, a filtrating cicatrix has been substituted to take the place of the sacrifice of a piece of iris. De Wecker, who made the suggestion, was first followed by Lagrange, Elliot, Herbert, von Hippel, and many others. From Mr. Davenport's paper[4] on 405 trephine operations at Moorfields in four years, in the September number of the *British Journal of Ophthalmology*, Elliot's trephine operation appears to be the most popular for simple chronic glaucoma. Personally I quite agree with this; while iridectomy, introduced by von Graefe seventy years ago, still holds its own for congestive and acute glaucoma.

The pathology of glaucoma has been taught us in the past by such masters as Priestley Smith and Treacher Collins. Lately, Thompson Henderson has advanced a new theory: that the access of the aqueous to the canal of Schlemm is prevented by sclerosis of the ligamentum pectinatum, as a predisposing cause, coupled with an immediate exciting cause which is vascular. Colonel Herbert has advanced another new theory, that chronic simple glaucoma arises mainly, if not entirely, from a defective inward pull upon the pectinate ligament. Removal of a cataractous lens in its capsule is strongly advocated by many, especially Major Smith and Dr. Barraquer, and yet the more conservative of us still cling to the old linear operation which generally entails, it is true, a needling of the capsule afterwards, but as a rule yields most excellent results in the end.

We certainly have improved very much in the treatment of convergent strabismus

[1] *Proceedings*, 1915, viii (Sect. Ophth.), pp. 127-148.
[2] *Ibid.*, 1917, x (Sect. Ophth.), p. 43.
[3] *Ibid.*, 1926, xix (Sect. Ophth. and Laryng.), (Joint Disc. No. 6), p. 85.
[4] *Brit. Journ. Ophth.*, 1926, x, p. 480.

in children. First, we carefully correct the error of refraction and force the lazy eye to work, by completely excluding the good eye many hours a day; and then, when vision has improved in the squinting eye, if an operation is necessary, instead of dividing one or both internal recti, which was the earlier custom and which frequently led to divergent strabismus in later life, we advance the external rectus of one or both eyes, and only divide the internal rectus in very bad cases. But owing to the enlightenment of the parents who bring their children now at an earlier age, a very large number of these cases are cured by glasses alone and operations for squint are much fewer than formerly. The names of Worth and Bishop Harman are conspicuously associated with all forms of squint treatment.

The Great War brought to light new operations and new treatments which have since been recorded in various transactions and papers, but the only reference I have time to make is to say how proud we all have been of the excellent work in our department that was done by Sir William Lister, associated with many workers, among whom we number one of our secretaries, Mr. Cunningham.

A very important part of their work consisted in the prevention of the spread of trachoma by means of segregation and special precautions. This disease hitherto had always been the scourge of armies when Easterns formed part of the fighting force.

Another great advance that has taken place has been in the education of the intending oculist. In the early days the only eye work was surgical, and when the various hospitals established eye departments one of the surgeons of the staff was selected as head of that department. Naturally the younger men who aimed at specializing in eye work concentrated on surgery and took the Fellowship of the Royal College of Surgeons, the study for which occupied all their time to the exclusion of any deep knowledge of medicine; consequently the proportion of oculists without a special medical degree at that time was *four to one*. As the knowledge of ophthalmology increased it became apparent that medicine was as important, or even more important, than surgery, so that now almost all the younger oculists possess a medical degree and the proportion is reversed.

A few years back Mr. Rayner Batten [1] read a paper before this Section hinting that the time might come when some, conscious of not being good at surgery, would concentrate on the medical side and call themselves medical ophthalmologists with the prefix of Dr., which (in London) is not considered to be our correct designation.

One great advance in our education has been the recent establishment of diplomas in ophthalmology and the possibility of taking the F.R.C.S., and the M.S., of London, with ophthalmology.

I would, personally, speaking from my own experience, strongly urge those who have just qualified and have started serving their apprenticeship as clinical assistants at one of our eye hospitals, to spend at least a year in general practice if they can possibly manage it. The value of this experience is priceless. It will teach them first that the eye is a very intimate part of the body and not a solitary organ; it will teach them how to drop their hospital manners and how to deal with private patients, it will teach them what they are never taught, or certainly in my day were never taught, how to deal with their colleagues and to realize that what is called medical etiquette is nothing more than acting according to the principles of common politeness and doing to others as you would be done by.

Although we cannot point to any great changes in surgical instruments during this long period, our equipment has enormously improved. Whereas the reflecting ophthalmoscope requires a distinct education to enable it to be used efficiently, the electric ophthalmoscope has considerably lessened the difficulties and put into the

[1] *Proceedings*, 1919, xiii (Sect. Ophth.), p. 11.

hands of every medical man the means of viewing the fundus. At first this may prove a mixed blessing, but eventually it must be for good. A very great advantage of this instrument is the possibility of examining a patient in any position. On account of being able to approach so near the eye with the instrument, we can get a more extensive view of the fundus through a smaller pupil, and a darkened room is not a *sine qua non*.

In association with the ophthalmoscope I must allude to the increased facility for recording pictures of the fundus which has been instituted by a private firm at the suggestion and under the supervision of Mr. Rayner Batten. Such recording will enable us to study different phases of a disease in the same subject at different times, and also the same disease in different subjects and under different treatment; and these collective records will be most valuable for educational purposes.

The latest Meyrowitz model of the ophthalmometer, originally given us by Javal and Schiotz, is a great improvement on the old Kagenaar model, and I strongly urge its more extended use, for if used intelligently as a servant and not as a master, it is a most valuable instrument, saving time in refraction work and giving an accuracy (especially in the estimation of small degrees) that no other method can rival.

Lastly, during the last few years Dr. Gullstrand has introduced us to the *slit lamp*. This instrument is surely going to help us in thoroughly appreciating structures and changes in the anterior part of the eye, as the ophthalmoscope has done in the posterior region. As it has taken years for us to become acquainted with the latter, so it will probably be years before the slit lamp has yielded us all the knowledge we hope to obtain from it.

This leads me to ask, what do we hope to gain in future in our knowledge of general ophthalmology? One thing is certain, there are still many more "worlds to conquer." Will some of those present discover the specific micro-organism of trachoma and vernal catarrh? Shall we have research workers who will be able to differentiate between different forms of streptococci, for surely the great varieties of effects produced by streptococcal infection cannot be entirely due to the different soils in which they are found.

May we look forward to some more work from Sir John Parsons, Mr. Leslie Paton, and Dr. Gordon Holmes, who have already added so much to our knowledge of the neurological side of ophthalmology? Mr. Leslie Paton's able article on the fifth nerve in a recent number of the *British Journal of Ophthalmology*[1] indicates that there is still further research work to be done in this direction.

On the scientific side it will be very interesting if we can settle the theory of accommodation. Recently at Oxford, in a very able paper, Dr. Thompson Henderson has sought to overthrow Tscherning's theory and more or less to side with that of Helmholtz, but he has not yet quite convinced all of us on this point.

In their recent work on the "Pathology and Bacteriology of the Eye," which I strongly urge everyone to read, Mr. Treacher Collins and Mr. Mayou indicate in many places where our knowledge is still deficient, and where matters at present unexplained require elucidation.

I think there is still a good deal to be learnt in connexion with blood-pressure, both high and low; and here let me remark how important it is in recording blood-pressure to give the systolic and diastolic pressures, as insisted upon by Dr. Halls Dally. Remember that functional high blood-pressure which may be of no moment, may, if persisting, pass into *organic* high blood-pressure with all its grave associations—arterio-sclerosis, renal disease, &c.—and that the oculist may be the first and only doctor the patient consults (for glasses at the presbyopic period). Consequently, if he sees evidence of arterio-sclerosis or any other serious change, he has the

[1] "The Trigeminal and its Ocular Lesions," *Brit Journ. Ophth.*, 1926, x, pp. 305-342.

opportunity of sounding the warning note and advising his patient to be thoroughly overhauled by a physician, thus, perhaps, preventing permanent incapacity or premature death.

We still need to know more about the effect of the various endocrine glands on the eye in health and disease. The work of Mr. Fisher and of Dr. de Schweinitz has already helped us very much in connexion with the pituitary gland.

Some excellent research work is being done, for example, the paper on ocular circulation by Duke Elder in the last (October) number of the *British Journal of Ophthalmology*.[1] But we want more research workers. It is not fair to expect anyone who has his or her living to make to give up all their time to research, and even if part of their time only is employed they probably approach their task fatigued by routine hospital work. They should be freed from financial worries, and we should try to persuade some future Carnegie or Rockefeller to endow more research scholarships in ophthalmology.

The changes I have cited form only a very small part of the whole, but are sufficient to show the enormous progress that has taken place—a progress that is ever continuing. Of course progress may mean entirely changing our views and opinions, but remember what Pope said: "A man should never be ashamed to say that he has been wrong"—it is only saying in other words, "I am wiser to-day than I was yesterday."

We have a grand stimulus to help in this progress when we realize what our work is.

Treacher Collins in his Bowman Lecture, Elliot Smith and Sir Arthur Keith, have shown us that the development of the area in the brain associated with vision has proceeded *pari passu* with the development of our physical and spiritual state. We can manage without taste, smell and even hearing, but with blindness we lose our independence, and in the whole of medicine no part, it seems to me, is so overwhelmingly important as ophthalmology. This consideration should make us always put in good work which, at the day's end or our life's end, will always leave a satisfactory feeling of "something attempted, something done."

[1] *Brit. Journ. Ophth.*, 1926, x, pp. 513-572.